What is the NeuroShell Trader?

The NeuroShell Trader and NeuroShell Trader Professional are revolutionary products for building and testing sophisticated trading systems. They are so powerful that beginners as well as professionals will be able to handle a wide range of complex tasks. You can utilize the most powerful and advanced artificial intelligence techniques, like neural networks and genetic algorithms, as easily as you use indicators and optimizers. You'll be running circles around artificial intelligence Ph.D.s and statisticians.

Use the NeuroShell Trader for the following tasks:

- Predicting prices, price changes, and indicators into the future
- Developing buy/sell signals and discovering trends
- Using our library of over 700 indicators, including regression, arithmetic, rules, logic, to build powerful trading rules
- Building complex technical indicators from our base library without using a programming language
- Backtesting of trading with your own rules, predictions, and/or indicators
- Building neural network financial models that are optimized by either increasing profit or minimizing prediction error
- Graphing prices, indicators, and predictions
- Exporting predictions and indicators for use by other programs
- Discovering multidimensional patterns in time series data that are too complex to be visualized

The NeuroShell Trader is revolutionary because it was built from the beginning for predicting financial markets. It is not a neural network package that has been adapted for finance, nor is it a financial or charting package that has been adapted for neural networks. The neural nets, charting, indicators, and backtest trading are elegantly blended together so that they all work seamlessly together. In one word, it is "ergonomic".

The NeuroShell Trader is revolutionary for another reason, too. The neural networks used in the NeuroShell Trader are new, state-of-the-art, and unlike any others you may have seen before. They are the result of several years of research. There are absolutely no parameters to set and no neural network knowledge whatsoever is required to use them. They are very, very fast and accurate. If you do have previous neural network knowledge, you should forget it because you won't need it for these nets. There is nothing to know and no complicated testing process.

The NeuroShell Trader includes the tools that can make neural nets work for you. The nets train in seconds rather than hours so you can test your trading systems in a reasonable amount of time. The Trader's ability to mix data streams (exchange rates to predict stocks, for example) enables you to build complex models. You can seamlessly blend several neural nets or other models into a single trading system that is robust over changing market conditions. You can use the NeuroShell Trader to enhance your existing trading system, a technique used by many successful traders.

In the NeuroShell Trader, all prices, indicators, and predictions are data streams that can be operated on just as raw data. Indicators can be fed into predictions and other indicators. Predictions can also be fed into indicators and other predictions. Both nested indicators and nested neural networks are not only possible but also easy. The possibilities are endless.

A complete portfolio of stocks, futures, or other issues can be loaded into one multiple page chart (limited by memory). Any indicators or predictions you make to the first issue in the chart are automatically applied to all of them, saving you hours of work that you would have spent using other neural network programs.

You can fine-tune your trading system before you trade it by "walking forward" with every neural network prediction. That is, you can train the network on a couple of years of data back in time and then test the predictions on the next year. Then, automatically, the program will step forward in time to train and test again for you on more recent data. This continuing process shows you how consistently predictive your indicators and other input variables have been through the past.

In the NeuroShell Trader Professional, you have all features of the NeuroShell Trader, plus powerful optimization done by evolutionary genetic algorithms. You can use the optimizer for finding the best indicators, parameters for those indicators, and trading rules. You can also use it to find the best inputs for neural network predictions and for trading rules.

The optimizations in the NeuroShell Trader Professional are not "exhaustive search" processes, meaning that they don't work by trying every combination in turn. This enables far more parameters, rules, etc., to be optimized at once in a reasonable period of time.

Here is a very important feature of the trading strategy optimizer: you can run backtesting on more recent time periods than those upon which the optimizations were performed. This means that you can have true out of sample testing to prevent you from trading with "over fit" models.

In the NeuroShell Trader Professional, you will have a choice of several optimization objectives other than minimizing error or maximizing net profit. For example, minimizing draw down, maximizing return on trades, maximizing correlation of predictions, and many more.

The NeuroShell Trader Professional also gives you more advanced indicators, like Principal Component Analysis, wavelets, and

Fourier analysis. It features alerts you can set to notify you of important trading situations. Finally, you have control over how many hidden neurons are used in the neural netw orks both during and after optimization.

Topics of Interest:

What the NeuroShell Trader is NOT

Tutorial

Displaying Data

What are Indicators?

What are Neural Netw orks?

What are Trading Strategies?

What the NeuroShell Trader is NOT

The NeuroShell Trader and NeuroShell Trader Professional are not get rich quick schemes. They will require that you find effective trading strategies that work best for you. This will take some effort on your part.

These products do not offer a predeveloped trading strategy that is guaranteed to make money. They do, however, provide you with state-of-the-art artificial intelligence tools so you can make your own customized models that no one else possesses. This will require some experimentation, and even the optimization techniques in the NeuroShell Trader Professional are not turnkey moneymakers. It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Our systems were not designed to be a replacement for classic charting packages that feature extensive graphics capabilities, and they were not intended to have the most advanced or comprehensive charting features.

Topics of Interest:
What is the NeuroShell Trader?
Tutorial

Displaying Data
What are Indicators?
What are Neural Networks?
What are Trading Strategies?

Installing NeuroShell Trader

System Requirements

NeuroShell Trader requires a Pentium (or equivalent) 1.4 GHz (or faster) computer, 128MB of RAM, at least 40MB of hard disk space and Window s 200 or XP operating system (NOT 95, 98, ME or NT).

To install NeuroShell Trader from a CD

1.   Insert the CD into your CD-ROM player.
2.   Click the **Start** button and choose the **Run** command (Steps 2 - 4 may be unnecessary if your CD-ROM is able to detect a new CD-ROM automatically).
3.   In the Open box, type: d:setup (or replace d: w ith the drive letter associated w ith you CD-ROM drive).
4.   Press the **OK** button to start the installation.
5.   Follow the installation instructions.

To run NeuroShell Trader

1.   Choose **Programs** from the Start menu.
2.   Choose **NeuroShell Trader 4** group.
3.   Choose **NeuroShell Trader**.

If you receive an error w hen trying to run NeuroShell Trader please refer to Troubleshooting.

NeuroShell Trader Activation

When the NeuroShell Trader software protection is not already activated on a computer, the NeuroShell Trader Authorization screen is displayed when the program is first run. This screen allows you to activate the NeuroShell Trader software. Only one computer can be activated at any given time for a given NeuroShell Trader software license.

To activate the NeuroShell Trader:
1.   Enter the product **Serial Number**.
2.   Enter the **Password** that you setup with the Ward Systems Group Sales Department.
3.   If you frequently run one NeuroShell Trader license on multiple computers, select the **Display deactivation dialog when NeuroShell Trader is closed** option at the bottom, so you won't forget to deactivate one computer before running on another computer. You should leave this option unchecked if you will be running NeuroShell Trader on only one computer.
4.   Select the **OK** button.

After activating, the NeuroShell Trader will run normally.

If there are problems using the internet authorization, you will receive an appropriate message and a **Manual Authorization** tab will appear. If you continue to have troubles using internet authorization, press the Manual Authorization tab and follow the instructions for manually deactivating the product with Ward Systems Group.

Deactivation:
- The software protection method allows you to run the software on different computers. You can install the software on multiple computers, but you can not run the software on the computers at the same time. Once activated on a given computer, you will need to deactivate that computer before you can activate and run the software on a different computer. REMEMBER, only one computer can be activated at any given time and if you forget to deactivate the first computer, you will be unable to activate the second computer until the first computer has been deactivated.
- If you are frequently running one license on multiple computers, it is suggested that you select the **Display deactivation dialog when NeuroShell Trader is closed** option at the bottom of the activation dialog, so you don't forget to deactivate one computer before running on another computer.
- If you permanently move the software from one computer to another or move the software from an old hard drive to a new hard drive, you must first deactivate the software before uninstalling or moving it.
- You must deactivate the software if you decide to return NeuroShell Trader within the 30-day return period.

To deactivate the NeuroShell Trader:
1.   Select the About NeuroShell Trader menu item from the Help menu.
2.   Press the Authorization button

Printing the NeuroShell Trader Manual

The NeuroShell Trader manual is everything you see in the Help Contents.   Note that the Help Contents is divided into books, similar to the w ay a manual is divided into chapters. Printing of one or more Help Books/Topics may be desirable if you w ant to view the topics in printed format.

Getting to the NeuroShell Help Contents
1.   Select **Contents** from the **Help** Menu.
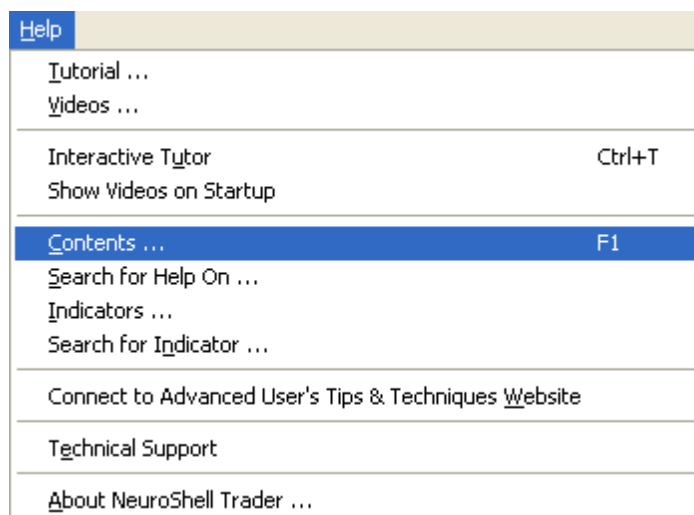
Printing a Book from the Help Contents
1.   Place the cursor in the Help Book you w ish to print.
2.   Press the **Print** button.
3.   Under **Page Range**, select **All**.
4.   Press the **OK** button.

Printing a Topic from the Help Contents
1.   Place the cursor in the Help Topic you w ish to print.
2.   Press the **Print** button.
3.   Under **Page Range**, select **All**.
4.   Press the **OK** button.

Printing a Topic from within a Topic
1.   Press the **Print** button.
2.   Under **Page Range**, select **All**.
3.   Press the **OK** button.

Troubleshooting:
-    If your help file is printing in the incorrect orientation(Landscape vs. Portrait) use the properties button on the Print Dialog to select the desired print orientation.

NeuroShell Trader Tutorial

Tutorial overview

The NeuroShell Trader is trading system building softw are. It is not a trading system in its ow n right, it is a toolkit of both traditional and artificial intelligence (AI) techniques you can combine to form computerized trading models. The models can consist of indicators and rules like traders have used for years, artificial intelligence techniques, or hybrids of both. It w ill build models for equities, futures, commodities, options, FOREX, indexes and more. You can build models for exchanges all over the w orld, like the NYSE, AMEX, FTSE, DAX, ASX, TSX, SFE, and many more. To build models you just need to be able to obtain data for the instrument or exchange in w hich you are interested. Then the models you build w ill automatically back-test, and continue to give signals into the future as new data arrive.

Advanced degrees and skills not necessary

To use NeuroShell you do not need to be a programmer, a Ph.D., an AI expert, a mathematician, or a statistician. In fact, sometimes it is better that you are NOT one of those things. That is because neural netw ork experts, for example, frequently cannot come to grips w ith how easy and fast it is to train our neural netw orks. They are usually tied to the old style neural nets that require lots of "tw eaking" to even get a net w orking. Often they think there must be something inferior about our technology because w e have made it simple enough for traders and other novices to use.

Artificial intelligence study not required

Many people think they must have to read books about neural netw orks, genetic algorithms, and fuzzy logic or take a course before they can effectively utilize our softw are. That is just not true. We have already done all that studying for you starting in 1988, and created softw are that allow s you to concentrate on the business end, not the science end. Our genetic algorithms, for example, act almost like other traditional optimizers. The main difference is you don't have to give them search increments, because they don't search the same w ay. With our advanced neural nets, you mainly w orry about w hat to feed them, instead of how to get them configured and running. We let you drive w ith an automatic transmission, pow er w indow s, pow er steering, and pow er seats instead of making you learn to shift gears and do everything else manually.

Not a "silver bullet"

Although w e have made artificial intelligence easier to use, it does not instantly build w onderful trading systems. How ever, w e do provide a number of examples and there are many traditional systems designed by others available in the Trader Tips from Stocks and Commodities section of our advanced users w ebsite: http://w w w .w ard.net/ in the Trader Tips from Stocks and Commodities section.

The NeuroShell DayTrader Professional is like the NeuroShell Trader Professional, except that it reads and displays intraday (real time) data bars. There are also some additional indicators to define time based events. For example you can specify you only w ant to trade betw een 10 am and 11am.

Everything is chart based

Charts are the major component of NeuroShell. You may open many charts at one time, either new ones or ones you have previously built and saved. When you create a new chart, you specify their periodicity w ith w hich you w ant to see and process the data, as w ell as how far back in time you w ant to load the data. Next you specify the related instruments w hose historical data should be loaded into the chart. They are the target instruments for w hich you w ish to create trading signals. Multiple instruments in the chart show up in their ow n chart page. For the rest of the discussion in this document, let's say you load IBM, DELL, HPQ, and AAPL as your target instruments. (They don't have to be stocks; they can be FOREX pairs, commodities, E-minis, options, etc).

Data streams

Charts contain data streams, w hich can be plotted or hidden. Of course, the first data streams loaded w ill be open, high, low , close, volume, and possibly more raw data for the target instruments. You can also insert other data streams called other instrument data that w ill be available in each chart page, like indexes or Data Sources for other stocks. This other instrument data is information you w ant to use to create trading signals. For discussion, let's say you believe that the Dow Jones US Computer Index ($DJUCR on eSignal) and INTC w ill be useful for deciding how the target computer stocks should be traded. You w ould then load these as other instrument data so that they w ill be available data streams in all chart pages.

Indicators

The next data streams you w ill w ant to include w ill probably be indicators. Models generally are built using indicators based upon the raw data and the other instrument data. Let's say you believe that the follow ing indicators w ill be useful in models that w ill produce trading signals, because you have heard people in your investment club talking about them:

1. The spread betw een each target stock and INTC
2. The relative strength betw een each target stock and $DJUCR
3. A stochastic %k indicator applied to each target stock

Therefore, the next thing you might do is insert the indicators above into your chart using the Indicator Wizard.

Sometimes you may have in mind indicators that are too complex even for our Indicator Wizard to construct. In that case, you can program your own in standard languages.

You may or may not have a clue about what the indicators above do - read on.

Models

Once the chart loads up with the requested data, you are ready to define one or more models in the chart. Any model that you build in the chart automatically applies to all instruments in the chart. Your model can be optimized the same for all chart pages, or custom optimized for each chart page. Models can be either Trading Strategies or Predictions.

You may or may not have a clue about how the indicators you have chosen work. If you do, you probably have some idea about how they would be used to generate trading signals, rules like "Buy when the relative strength between the stock and the $DJUCR is high, and the spread with INTC is low ." In this case you will want your model(s) to be Trading strategies, even if you are unsure what values should be considered high and low above. The genetic algorithm optimizer will find the values for you.

If you either have no clue about how the indicators work, or no clue about appropriate rules for them, you will probably want to build a Prediction with a neural net for your model(s), because neural nets find their own rules.
Note that you can insert several models in a chart. Once you insert a model, it automatically applies to all chart pages.

Trading Strategies

The Trading Strategy Wizard is a fast mechanism for entering trading rules without having to type messy formulas or write in some algorithmic programming-like language. The Wizard is all point and click. You just list the rules for long entry, long exit, short entry, and short exit (cover). Each of these rules is in fact an indicator you build just like any other indicator - with the Indicator Wizard. You can also enter indicators for stop and limit price levels, including trailing stops.

If you want to optimize your trading strategies, the genetic algorithm optimizer will do these things for you:

1. Find which of the rules you have listed should be used in combination
2. Find out what the parameters of the indicators in your rules should be set to
3. Perform 1. and 2. above at the same time (we call this full optimization)

Even your stops and limits can be optimized.

When the Trading strategy is complete, it will show you historical buy and sell signals. As new data is entered into the future, those buy and sell signals will continue to appear with each new bar. You can insert a variety of indicators to plot how your profit is growing.

Predictions

Predictions are neural nets made with the Prediction Wizard. That's what our standard neural nets do, they make predictions about the future value of a data stream, usually a price or change in price, but any data stream can be predicted.

Here is basically all you have to do to make a prediction model:

1. Choose some inputs - data streams, usually indicators, that you believe are leading indicators of the market
2. Decide what you want to predict, usually change or percent change of the open or close
3. Decide how much historical data will be used to train the neural net
4. Decide how much historical data you want to use to test how well the neural net has learned

If you want to optimize your prediction, the genetic algorithm optimizer will do these things for you:

1. Find which of the inputs you have listed should be used in combination
2. Find out what the parameters of the indicators in your inputs should be set to
3. Perform 1. and 2. above at the same time (we call this full optimization)
4. Find neural network thresholds for trading

When the prediction is complete, it will show you historical buy and sell signals. As new data arrive in the future, those buy and sell signals will continue to appear with each new bar. You can insert a variety of indicators to plot how your profit is growing.

Back-testing

Sometimes when you build traditional models, neural net models, or optimized models of any type, it is possible to make a model so good that it does not hold up with future market conditions. This is called over-fitting. Therefore, NeuroShell contains facilities that will automatically backtest with out-of-sample data for you, so you can gain confidence that your model will hold up in the future.

Alerts

NeuroShell lets you take almost any condition, not just trading signals, and define an alert to let you know when that condition has just occurred.

Further Learning

Your next step should be to view the training videos that we have provided. They are just a few minutes each and will make learning NeuroShell so much easier than trying to learn from our help file.

After you have watched the videos a few times, load our example charts in order and read the accompanying explanations carefully.

Finally, if you need help, contact our technical support department.

Videos

Watching the follow ing videos is the fastest w ay to learn the mechanics of using the NeuroShell Trader. Once you've mastered the mechanics, you can begin to craft successful trading systems.

You must have a speaker and sound card on your computer to properly view these video files. You must also have the NeuroShell Trader Video CD inserted into your CD rom/DVD drive because the video files are on that CD and are not copied to your computer.

If you w ish to have access to the videos w ithout the CD you can copy the videos from the CD to a videos subdirectory of the NeuroShell Trader program directory (i.e. C:\NeuroShell Trader\Videos).

Click on the each topic below to view the corresponding video.   The script for each video is included in a help topic w ith the same name in the NeuroShell Trader help file.

The videos are displayed in the Camtasia Player. If you're having trouble seeing the entire video, select the Play Menu, and click on Full Screen. When you're view ing in Full Screen mode, you need to right mouse click anyw here on the screen to view a list of Camtasia Player controls.

Overview

Getting Started – Tips to get NeuroShell Trader up and running as soon as possible. Getting Started Video Script

Charts

Open a Price Chart – Start w ith either price or price and volume and then add indicators, Trading Strategy rules, and/or predictions. Open a Price Chart Video Script

Save Your Ow n Chart Template – Store your favorite charts for later use. Save Your Ow n Chart Template Video Script

Charts Analysis Templates – Apply standard studies such as MACD, Stochastic, and Moving Average Crossovers to build a trading system. Charts Analysis Templates Video Script

Workspaces – Save and load a collection of charts. Workspaces Video Script

Format Data Series – Change names, line colors, and graph styles, as w ell as use gradient color bars. Format Data Series Video Script

Draw ing Tools – Add trend lines, channels, Fibonacci retracements, lines, text and more. Draw ing Tools Video Script

Different Chart View s – Choose from chart, snapshot, portfolio and historical view s. Different Chart View s Video Script

Zoom Controls – Get a closer view of specific data in your chart. Zoom Controls Video Script

Existing Data and Other Instrument Data – Add other stocks, indexes, etc. to your chart. Existing Data and Other Instrument Data Video Script

Rearranging Charts – Move subgraphs on the chart using drag and drop. Rearranging Charts Video Script

Format Menu – Layout the chart by hiding data, moving subgraphs, adding or removing issues, or changing dates. Format Menu Video Script

Add Chart Pages – Apply your model to other stocks, futures, etc. Add Chart Pages Video Script

Additional Formatting and Multiple Charts – Rename data and view multiple charts. Additional Formatting and Multiple Charts Video Script

Indicators

Inserting Simple Indicators – Insert one of the more than 800 indicators. Inserting Simple Indicators Video Script

Modifying Indicator Default Parameters – Change time periods, etc. Modifying Indicator Default Parameters Video Script

Indicator Shortcuts – Create more than one indicator at a time, etc. Indicator Shortcuts Video Script

Indicator Options – Move categories, change colors, day boundaries. Indicator Options Video Script

Complex Indicators – Combine them to create intricate studies. Complex Indicators Video Script

Indicators Bottom Up Method – Create smaller parts, and then combine indicators. Indicators Bottom Up Method Video Script

Indicators Top Dow n Method – Build the overall indicator. Indicators Top Dow n Method Video Script

Write Your Own Custom Indicators – Create a collection of your favorites (Trader Professional and DayTrader ONLY). Write Your Own Custom Indicators Video Script

Trading Strategies

Build a Trading Strategy – Use the Trading Strategy Wizard to generate buy/sell signals. Build a Trading Strategy Video Script

Save Your Trading Strategy Template – Develop a library of trading rules that may be applied to any market. Save Your Trading Strategy Template Video Script

Trading Strategies Analysis Templates – Choose basic systems such as long and short entry or popular systems such as RSI or Moving Average Crossovers. Trading Strategies Analysis Templates Video Script

Applying Trading Strategies – Apply rules to new data. Applying Trading Strategies Video Script

Apply Trading Strategies to other stocks, futures, options, etc. – Add additional chart pages. Apply Trading Strategies to other stocks, futures, options, etc Video Script

Trading Strategy Options – Change the number of shares, dates (paper trading), costs, optimization objective, etc. Trading Strategy Options Video Script

Optimizing Trading Strategies – Set parameter ranges. Optimizing Trading Strategies Video Script

Predictions

Create Your Own Prediction – Forecast prices, change, etc. w ith the Prediction Wizard. Create Your Own Prediction Video Script

Save Your Neural Network – Apply your custom model to many different markets. Save Your Neural Network Video Script

Prediction Analysis Templates – Create neural network forecasts w ith familiar indicators. Prediction Analysis Templates Video Script

Neural Nets Overview – Nets learn patterns in past data. Neural Nets Overview Video Script

Prediction Results – Examine the results of your models. Prediction Results Video Script

What to Predict and Which Inputs to Use – Select the best stocks, futures, or options for success. What to Predict and Which Inputs to Use Video Script

Panel of Experts – Combine nets w ith other predictions, trading rules. Panel of Experts Video Script

Prediction Options – Change w hat to predict, optimization objective, dates (paper trading), costs, types of positions, training criteria, etc. Prediction Options Video Script

Ticker Scanning

Ticker Scanning – Scan a large number of ticker symbols based on the rules you define. Ticker Scanning Video Script

Alerts

Alerts – Add sound or screen w arnings to your trading system (Trader Professional and DayTrader Professional ONLY). Alerts Video Script

Integrated Trading

Integrated Trading – Integrated Brokerage Trading allow s trades from a Trading Strategy to be sent directly to a brokerage or to a list of email address. Integrated Trading Video Script

Portfolio Analysis

Using Chart Page Calculations – These calculations can help you decide w hich stocks, futures, etc. to buy and w hich to sell in order to maximize your portfolio equity. Portfolio Analysis Using Chart Page Calculations Video Script

Data Details

Data Overview – Use existing data, dow nload new data. Data Overview Video Script

Mapping Directories – Set up the NeuroShell Trader to automatically read your data files and assign issue categories to the data. Mapping Directories Video Script

Data File Formats – Use ASCII or text files, as w ell as files in the CSI and MetaStock formats. Data File Formats Video Script

Modifying Raw Data – Use this utility to correct values in your data file. Modifying Raw Data Video Script

Data Servers – Select a data server for intraday and end of day data. Data Servers Video Script

Quote.com QCharts Basic – Choose for use w ith the NeuroShell DayTrader, Trader Pro, or Trader. Quote.com QCharts Basic Video Script

eSignal – Choose eSignal for any version of NeuroShell Trader. eSignal Video Script

Prophet.net – Select Prophet Connect for any version of NeuroShell Trader. Prophet.net Video Script

DialData – Sign up for Track Data's end of day feed for the NeuroShell Trader Professional or Trader.

Part A – Enter your userid and passw ord. DialData Part A Video Script

Part B – Create a dow nload list. DialData Part B Video Script

Part C – Dow nload data for use w ith your models. DialData Part C Video Script

Options

Options – Set preferences for your trading style. Options Video Script

Summary

Video Summary – Additional resources for w orking w ith the NeuroShell Trader. Summary Video Script

Note:

- If this help topic is displayed w henever the NeuroShell Trader runs, you can turn it off after you have view ed all the videos by unchecking the **Show Videos on Startup** menu item in the **Help** menu.

Using the CD-ROM

The CD-ROM provided w ith NeuroShell Trader includes historical data that starts in 1987. Any time that you w ant to access this data you w ill need to have the NeuroShell Trader Data CD-ROM in your CD-ROM drive.

If you haven't installed the current version of NeuroShell Trader, inserting the program CD-ROM w ill start the installation procedure. How ever, if you have already installed NeuroShell Trader and insert the data CD-ROM NeuroShell Trader w ill immediately recognize the CD-ROM and have the CD-ROM data available.

If you only need specific stocks and don't w ish to keep the NeuroShell Trader CD-ROM in your CD-ROM drive, you may copy the files from the NeuroShell Trader CD-ROM onto your hard disk and map the directories that you copy them to by Setting Up Data Directories.

Customizing Your Environment

You may w ant to customize your environment to hide data streams that you may never use or configure your environment to display data streams at certain times automatically.

1.   Select **Options** from the **Tools** menu. This activates the Options Dialog, w hich allow s you to customize your environment.
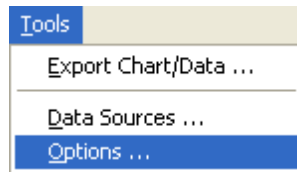
Options - Trading Orders

Use the trading orders options to select new order sound, pop-up notification and sending of orders to a brokerage.

To set the **Actions taken for new or revised trading orders**, select one of the options shown:

- **Play sound file -** When selected, causes a sound to play whenever an active trading strategy generates a trading order. Choose the desired sound from the dropdown list.

- **Popup order prompt/confirmation** – When selected, causes a pop-up order notification message (for example: Buy 100 Shares of Dell) whenever an active trading strategy generates a trading order.

- **Send orders to brokerage** – When selected, causes orders to be sent to the brokerage server selected in the **Brokerage** drop down list whenever an active trading strategy generates a trading order.

> Note: If **Popup order prompt/confirmation** is checked, then NeuroShell Trader will ask you if you want to send orders before sending them to the brokerage, otherwise it will simply send orders without user interaction to the brokerage.

The following are the brokerage servers distributed with NeuroShell Trader that can be selected in the **Brokerage** drop down list:

Interative Brokers – Sends trades to Interactive Brokers. For more detailed information see: Interactive Brokers

Order Emailer – Emails trades to a list of email addresses. For more detailed information see: Order Emailer

Ticker/Exchange Mapping – Loads the ticker/exchange mapping dialog which enables the specification of the brokerage ticker symbol and exchange for different data feed ticker symbols. Note that if no appropriate maps exist when a trading strategy is selected to be actively traded, NeuroShell Trader will prompt for an appropriate ticker and exchange mapping at that time.

Notes:

- Only active trading strategies will play sound files, show pop-up order messages, or send orders to a brokerage. To activate a trading strategy, select the **Alerts and Orders Window** menu item from the **View** menu and select the trading strategy on the **Active Trading** tab.
- Additional brokerage servers may be available from third party developers or developed using the NeuroShell Trader Brokerage API. Once installed, additional brokerage servers will be listed in the **Brokerage** drop down list.
- The list of available sounds is compiled from all the .WAV sound files located in the Sounds subdirectory (C:\NeuroShell Trader\Sounds). If you would like to use a custom sound not provided with NeuroShell Trader, simply copy the desired .WAV sound file into the Sounds subdirectory prior to running NeuroShell Trader.

Options - Wizards

Use the w izards options tab to select Default Wizard Interface Options.

The w izard interface options control the complexity of the trading strategy, prediction and indicator w izard interfaces.

By selectively turning on only desired interface options, you can customize the interface to show only those trading strategy, prediction, and indicator parameters and options that you w ill use. With the majority of the interface options turned off, you have a simple and easy to understand interface for creating basic trading strategies, predictions, and indicators. With the majority of the options turned on, you have an extensive interface for creating complex trading strategies, predictions, and indicators.

To avoid being overw helmed by the vast capabilities of the NeuroShell Trader, w e recommended that new users start w ith all the options turned off. Once you become comfortable w ith the simple interface, slow ly begin experimenting w ith the more advanced options.

To choose **Default Wizard Interface Options**:
1.   Use the + and - to expand or collapse categories in the list.
2.   Click in the box to the left of the option text to select or deselect an option.

For detailed information on each of the w izard interface option see:
Trading Strategy Wizard Interface Options
Prediction Wizard Interface Options
Indicator Wizard Interface Options

Options - Charts

Use the chart options to select the Open Chart retrain/rebacktest prompt sensitivity and chart autosaving.

To set the **Open chart retrain/rebacktest prompt sensitivity**, select one of the options show n:

- **Least Sensitive – Prompt upon stock splits or other major price adjustments.** This means you w ill be prompted to retrain/rebacktest w hen the NeuroShell Trader detects a split or a major price change. This is triggered w hen the last date of your prediction or Trading Strategy (w hen trained or backtested), changes its price by five percent or more.

- **Recommended Sensitivity – Prompt if last trading position has changed due to changes in data.** This means that if for some reason you're trading position does not match the same trading position as w hen you last saved your chart, you w ill be prompted to retrain/rebacktest. For example, this w ill prompt you if w hen you saved your chart you w ere "long" on the last day of training/backtesting and w hen you load your "new " data w ith the chart you are no longer "long" (short or no position) at the same date/time. This w ould happen if your data has changed and a trading signal w as triggered w ith the new data, but it w asn't w ith the data you had loaded the previous time that you saved the chart. This option w ill also prompt you w hen the **Least Sensitive** option w ould have.

- **Sensitive – Prompt w hen data does not extend as far back in time as w hen previously saved.** This means that if your request for data w as not filled back to the original date the Trading Strategy or Prediction w ere backtested or trained over you w ill be prompted to see if you w ant to retrain/rebacktest. This option w ill also prompt you w hen either of the low er sensitivities w ould have.

- **Most Sensitive – Prompt if data is not exactly the same as previously saved.** This means that even the slightest change in data w ill prompt a retrain/rebacktest message. This option may not be desirable if you are using the DayTrader w ith Quote.com because the data has been know n to change based on w hich server you attach to. Quote.com know s about this issue, but at the moment there appears to be no resolution in site. This option w ill also prompt you w hen any of the low er sensitivities w ould have.

Chart autosaving allow s unsaved changes you have made to a chart to be recovered in the event of a pow er failure, system crash, or other unexpected termination of NeuroShell Trader execution. If such a unexpected termination occurs, the next time the NeuroShell Trader is run, you w ill be prompted as to w hether or not you w ish to load the autosaved chart(s). While the NeuroShell Trader is running, the autosaved charts are saved in the \NeuroShell Trader\Charts directory under the name of _NSTTempXX.cht (w here XX represents a number not already used for saving other temporary charts). If no unexpected termination occurs, the autosaved chart(s) for the current session are deleted upon closing a chart or w hen exiting the NeuroShell Trader.

To set **Chart autosaving**, select one of the options show n:

- **On** –Charts w ill be autosaved after every major change made to the charts and prior to the start of prediction training or trading strategy backtesting.
- **Off** – Charts w ill not be autosaved.

When you are satisfied w ith the Options press the **OK** button.

Options - Advanced

Use the advaced options to select w hich data series get displayed w hen completing a prediction and w hich data series to display in the Existing Data/Calculations list.

For more information regarding the prediction data series versus the prediction signal data series refer to Using Predictions.

Choose the **Insert new prediction settings**:
- **Insert prediction signal data series** – After you have finished creating a prediction, using this option w ill display the prediction data series on the chart w ith predicted data values on the same bar they w ere predicted (For example the 2-day prediction for July 5th w ould be show n on July 3rd.). This results in predictions that can be used in other indicators or trading strategies prior to the actual result occurring.
- **Insert prediction data series** – After you have finished creating a prediction, using this option w ill display the prediction data series on the chart w ith predicted data values on the bar for w hich they are being predicted (For example the 2-day prediction for July 5th w ould be show n on July 5th.). This results in prediction values that can not be used in other indicators until the actual result is already know . This also results in the prediction values being displayed on the chart on future bars that have not yet occurred.

Select **Existing data/calculations settings**:
- **List prediction data series** - displays both the prediction and the prediction signal data series. If not selected, then only the prediction signal data series w ill be displayed in the Existing Data/Calculations list.

Select **Date interface settigns**
- **Allow real trading to begin before last chart date** – controls w hether the optional checkbox to **Start trading before last chart date** is displayed in the Dates tab of both the prediction and trading strategy parameters dialogs.

When you are satisfied w ith the Options press the **OK** button.

Options - Point Values

Use the point values options to specify the point values for each futures or forex ticker symbol you might use.

The point value specifies the amount by w hich the futures or forex price is multiplied to determine the dollar value of a contract. Point value should be used in a prediction or trading strategy if you w ant the profit/loss results to reflect the actual dollars you gained/lost instead of the points gained/lost.

To add a ticker symbol to the list, press the **Add Ticker** button.
To change the point value for a selected ticker, press the **Point Value** button.
To delete selected tickers press the **Delete Ticker** button.

When you have finished entering point values, press the **OK** button.

Note:
- In order for point values entered into this list to be utilized by a trading strategy or prediction, the **Point Values for futures, forex, etc** check box must be selected on the **Costs** tab in the parmeters dialog of the trading strategy or prediction.
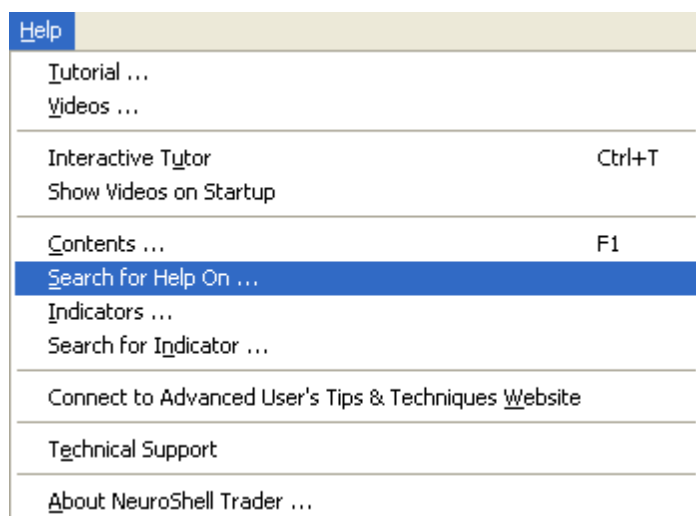
NeuroShell Trader Help

NeuroShell Trader help w ill allow you to find answ ers about any part of the program that you have a question about. To activate the NeuroShell Help Contents:

1.   Select the **Contents** menu item from the **Help** menu.
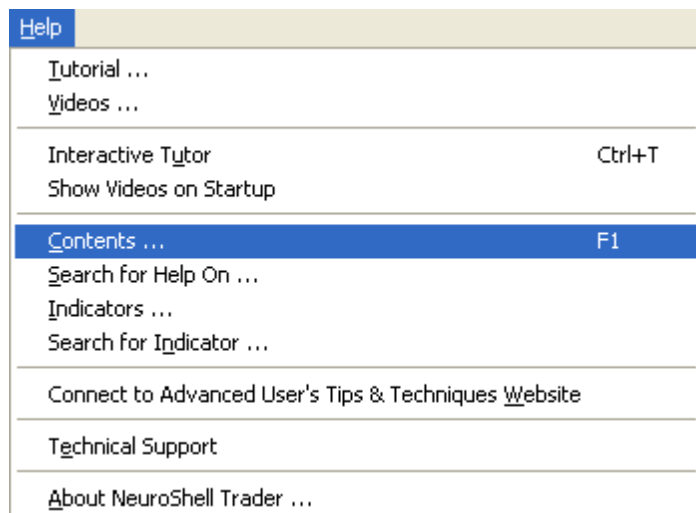
Additionally, if you w ant to search for a specific item you should:
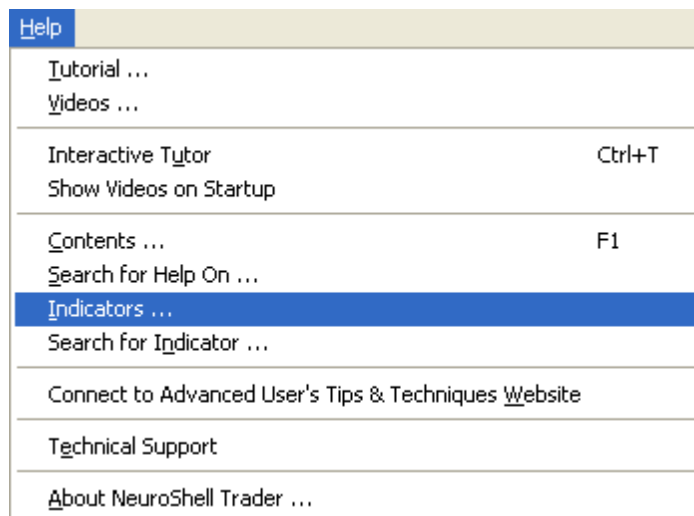
1.   Select **Search for Help On** from the **Help** menu.

Note:
*   When you are view ing a help topic you may right-click on it using the mouse to activate options that w ill allow you to Annotate, Copy, Print a Topic, change the Font, set/clear the Keep Help on Top property, or set/clear the Use System Colors property.

Indicator Help

Indicator Help can help you understand the meaning of an indicator. To activate the Indicator Help Contents:

1. Select the **Indicators** menu item from the **Help** menu.

Additionally, if you w ant to search for a specific indicator you should:

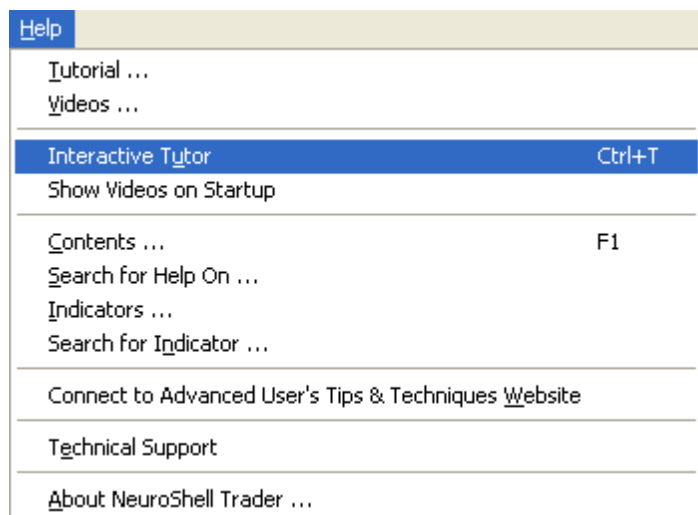1. Select the **Search for Indicator** menu item from the **Help** menu.
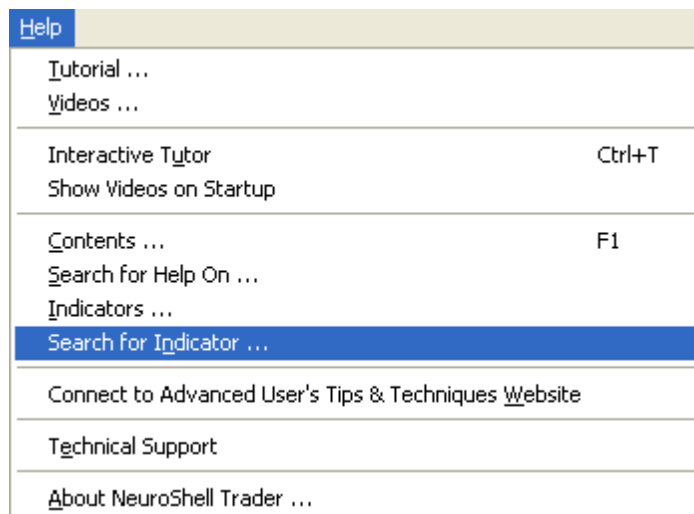
Note:
•   When you are view ing a help topic you may right-click on it using the mouse to activate options that w ill allow you to Annotate, Copy, Print a Topic, change the Font, set/clear the Keep Help on Top property, or set/clear the Use System Colors property.

Interactive Tutor

The Interactive Tutor is an option that helps you by providing you with information and options at every point in the NeuroShell Trader. It teaches you how to use NeuroShell Trader by displaying instructions and troubleshooting information for each screen you encounter. To activate the Interactive Tutor:

1. Select the **Interactive Tutor** menu item from the **Help** menu.

To deactivate the Interactive Tutor:

1. Deselect the **Interactive Tutor** menu item from the **Help** menu.

Note:
*   When you are viewing a help topic you may right-click on it using the mouse to activate options that will allow you to Annotate, Copy, Print a Topic, change the Font, set/clear the Keep Help on Top property, or set/clear the Use System Colors property.

Advanced User's Tips & Techniques Website

The Advanced User's Tips & Techniques Website ([http://w w w .w ard.net](http://www.ward.net)) is a w eb site dedicated to advanced topics for all of the Ward Systems Group products. It contains private information only for the use of Ward Systems Group customers, so to get into the product areas you w ill need a valid serial number for that product. The site includes the follow ing information for NeuroShell Trader:

- Notice of major bugs found.
- Availability of fixes or updates.
- Cost and availability of new releases.
- Beta tests that are coming and how you can be involved.
- Tips, techniques, and frequently asked technical questions (FAQ).
- Other product new s.
- User forum
- Custom programming

To activate the Advanced User's Tips & Techniques Website:
1. Select the **Connect to Advanced User's Tips & Techniques Website** menu item from the **Help** menu.

Activating About NeuroShell Trader

In order to activate the NeuroShell Trader About screen, w hich show s you product information, Ward Systems Group, Inc. contact information, and the ability to deactivate the softw are.

1. Select the **About NeuroShell Trader** menu item from the **Help** menu.
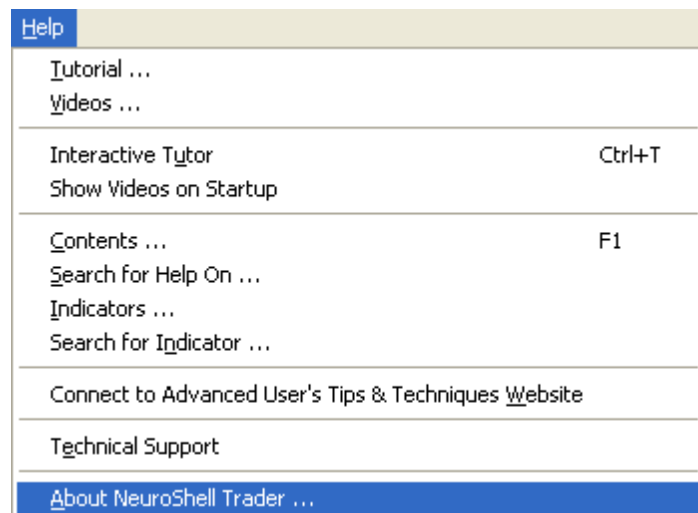
About NeuroShell Trader

This screen describes the version number, copyrights, contact information and the license agreement for NeuroShell Trader.

Use the **Authorization** button to deactivate the product. You will need to deactivate the product if you wish to activate it on a different computer. Examples of when you would deactivate the product are when switching back and forth between computers or when permanently moving the software to a different computer.

Ward Systems Group contact information is shown on the screen. You may also refer to any of the following:

Ward Systems Group Corporate Headquarters

Ward Systems Group Sales Department

Ward Systems Group Technical Support

NeuroShell Trader Deactivation

To deactivate the NeuroShell Trader:
1. Select the About NeuroShell Trader menu item from the Help menu.
2. Press the Authorization button

This screen allows you to deactivate the NeuroShell Trader. You will need to deactivate the product if you wish to activate it on a different computer. Examples of when you would deactivate the product are when switching back and forth between computers or when permanently moving the software to a different computer. Additionally, you will need to deactivate the software if you decide to return it within the 30-day return period.

In order to deactivate your product:
1. Enter the product **Serial Number**.
2. Enter the **Password** that you setup with the Ward Systems Group Sales Department.
3. If you frequently run one NeuroShell Trader license on multiple computers, select the **Display deactivation dialog when NeuroShell Trader is closed** option at the bottom, so you won't forget to deactivate one computer before running on another computer. You should leave this option unchecked if you will be running NeuroShell Trader on only one computer.
4. Select the **OK** button.

After deactivating, the NeuroShell Trader will immediately exit. To reactivate the Trader, simply rerun it and you will be prompted to activate the software.

If there are problems using the internet authorization, you will receive an appropriate message and a **Manual Authorization** tab will appear. If you continue to have troubles using internet authorization, press the Manual Authorization tab and follow the instructions for manually deactivating the product with Ward Systems Group.

Notes:
- The software protection method allows you to run the software on different computers. You can install the software on multiple computers, but you can not run the software on the computers at the same time. Once activated on a given computer, you will need to deactivate that computer before you can activate and run the software on a different computer. REMEMBER, only one computer can be activated at any given time and if you forget to deactivate the first computer, you will be unable to activate the second computer until the first computer has been deactivated.
- If you are frequently running one license on multiple computers, it is suggested that you select the **Display deactivation dialog when NeuroShell Trader is closed** option at the bottom of the activation dialog, so you don't forget to deactivate one computer before running on another computer.
- If you permanently move the software from one computer to another or move the software from an old hard drive to a new hard drive, you must first deactivate the software before uninstalling or moving it.
- You must deactivate the software if you decide to return NeuroShell Trader within the 30-day return period.

Data Sources

Data sources fall into one of three categories
- Data that you have on your computer (or a network)
- Data that is provided by a server
- End of Day Data that you want to download

Each of these types is unique and is setup using the **Data Sources** item on the **Tools** menu.
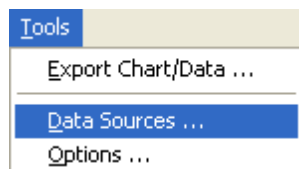
The data that you have on your computer (or a network) is described by any Data Files that you have. For more information on this please see Setting Up Data Directories. Data that is provided by a server is data that a data service provides you with data when you request it. For more information on this please see Setting Up Data Server. Data that you want to download using the included End of Day downloader will allow you to download data from DialData. For more information on this please see Downloading Data.

Topics of Interest:
Data Files
Setting Up Data Directories

Setting Up Data Server
Downloading Data

Setting Up Data Directories

Setting up data directories defines where your data files are located. It is very important that you properly define your data so that NeuroShell Trader knows the location of your data and the type of data you have. This is necessary so that when you want to use your data NeuroShell Trader will be able to easily access your data.

1. Select **Data Sources** from the **Tools** menu. This activates the data sources dialog box from which you can define and change the data sources used by NeuroShell Trader.
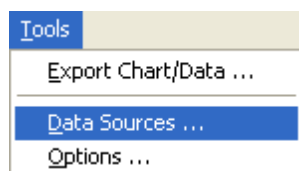
2. Select the **Directories/Files** tab. This displays the data sources tab from which you can define and change the data directories and thus the data files used by NeuroShell Trader.
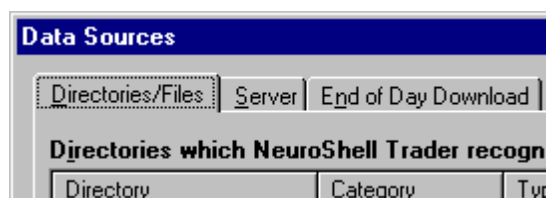
Topic of Interest:
Data Files

Data Sources Dialog: Directories/Files

There are several tools on this tab to help you define your data directories. The process of defining data directories allows NeuroShell Trader to know the location of your data files and the type of data in each file.

You can add directories by using either the **Auto Scan** button or the **Add Directory** button

Additionally, if a data directory is no longer desired, you can remove it by selecting the undesired directory and selecting the **Remove Directory** button**.**

Finally, when adding directories you will want to make sure that the category column is correct before exiting the Data Sources Dialog. NeuroShell Trader uses several techniques to attempt Auto Identification of the Category for each directory; however, frequently NeuroShell Trader is unable to properly identify the correct category. If you want to change the category of a directory, select the directory and then the **Change Category** button.

Tips:

- When setting up NeuroShell Trader to access AIQ data map the directory that contains the master.ndx and master.adf files. If you are having difficulty mapping or using your AIQ data you may consider using the "Rebuild Master List" functionality in your AIQ product. Please note that NeuroShell Trader is unable to read data from AIQ's data CD.

- When adding files to a directory that has already been listed in the Data Directories list the file will automatically be added if the type of file (i.e., AIQ, MetaStock, ASCII, etc.) matches one of the types of files that have been previously added to the Data Directories list. If the type of file added to a directory that is already listed in the Data Directories list does not match any of the types of files listed for that directory, then the Directory will need to be "rescanned". To "rescan" a directory you may use the **Add Directory** button or the **Auto Scan** button.

Topic of Interest:

Data Files

Auto Scan Dialog

The Auto Scan Dialog allow s you to scan a disk drive for files that NeuroShell Trader is able to read.

1. Select the disk drive you w ish to scan.
2. **Choose the type of auto scan to perform.**
    Note: If you choose Scan selected directory and its subdirectories, you should select the directory to be scanned.
3. Press the **OK** button.

Tip:
*   You may w ant to verify the Category assigned to each directory.

Topic of Interest:
Data Files

Add Directory Dialog

1. Select the Drive and Directory you wish to add to your Data Directories.
2. Press the **OK** button.

Tip:

- You may want to verify Categories of directories added.

Topic of Interest:

Data Files

Categories Dialog

The Categories Dialog allow s you to group instruments into logical categories. By doing so, data becomes easily identifiable w hen you are using NeuroShell Trader.

1. Select the category in the list that best describes the directory.
2. Press the **OK** button.

Data Files

The NeuroShell Trader reads ASCII files, MetaStock files, CSI files and AIQ files.

For NeuroShell trader to properly recognize and read an ASCII file the follow ing must be true:

- The extension must be: .CSV, .TXT, .PRN, or .ASC
- One of the first 10 row s must be a label row .
- In order for NeuroShell Trader to recognize the open, high, low , and close they must be labeled O or Open, H or High, L or Low , and C and Close.
- One of the data columns must contain dates.
- The data column that contains dates must have the w ord "Date" as the column label in the files label row .
- The data columns must be separated by commas, tabs, or spaces (or semi-colon if the w indow s regional settings are set such that a semi-colon is the standard w indow s list separator).
- If the file is space delimited, double quotes(") should be placed around any labels consisting of multiple w ords (i.e., "daily price") so that NeuroShell Trader w ill not think that the w ords are labels for different columns (i.e., the column label "daily" and the column label "price").
- The data must have dates in sequential order either starting at the earliest date and progressing to the most recent date in the last data row OR starting w ith the last date and progressing to the earliest date in the last data row . Note that this doesn't mean that every date must be included (i.e. Weekends, Holidays, etc.).
- The file must contain valid dates in the date column. Valid date formats that NeuroShell Trader recognizes include all valid Window s date formats for the current regional settings. For example:

    English (United States) - m/d/yy, m/d/yyyy, mm/dd/yy, yy/mm/dd, etc.

    German (Standard) - dd.mm.yy, dd/mm/yy, d.m.yy, d.m.yyyy, etc.

    Additional valid date formats are limited to those w hich Window s can understand by adding "/" betw een the second and third characters, as w ell as betw een the forth and fifth characters. NeuroShell Trader w ill attempt this only if the date field is exactly six characters long and is not recognizable as a valid w indow s date for the current regional settings. For example:

    English (United States) - yymmdd and mmddyy

    German (Standard) - ddmmyy

    The only other valid date formats are yyyymmdd, mmddyyyy, and mmyy (for monthly data).

- (DayTrader Only) Intraday data files must have either a time included in the date column or a separate time column w hich contains a valid time. For example:

    Times included in Date Column – mm/dd/yy hh:mm am

    Times in separate Time Column – hh:mm am

    Valid time formats that NeuroShell Trader recognizes include all valid Window s time formats for the current regional settings. For example:

    English (United States) – hh:mm am, hh:mm:ss pm, HH:mm:ss, etc.

    German (Standard) – HH:mm, HH:mm:ss, etc.

    Additional valid time formats are limited to those w hich Window s can understand by adding ":" betw een the second and third characters, as w ell as betw een the forth and fifth characters (assuming 6 characters). NeuroShell Trader w ill attempt this only if the time is not recognizable as a valid w indow s time for the current regional settings. Valid formats include:

    All Regional Settings – hhmmss, hhmm, hmmss, or hmm

- The file cannot contain any extraneous data (i.e., total or summary information at the bottom of the columns).
- If your file contains missing data, you must put a non numeric character or string in place of the missing data (i.e., "∗"). Note that Comma separated text files w ill also recognize tw o commas (i.e., ,, or , ,) as denoting missing data.
- A file by the name of XYZ.CSV w ill be read into NeuroShell Trader as an instrument w ith the name XYZ.CSV and the ticker symbol XYZ. If you w ish to more accurately specify the name and ticker symbol, NeuroShell Trader w ill recognize an ASCII file that lists the ticker symbol on the first line of the file, the name on the second line of the file, and the label row on the third line of the file.

Notes:

- When setting up NeuroShell Trader to access AIQ data map the directory that contains the master.ndx and master.adf files. If you are having difficulty mapping or using your AIQ data you may consider using the "Rebuild Master List" functionality in your AIQ product. Please note that NeuroShell Trader is unable to read data from AIQ's data CD.

Setting Up Data Server

Setting up data directories defines where your data files are located. It is very important that you properly define your data so that NeuroShell Trader knows the location of your data and the type of data you have. This is necessary so that when you want to use your data NeuroShell Trader will be able to easily access your data.

1. Select **Data Sources** from the **Tools** menu. This activates the data sources dialog box from which you can define and change the data sources used by NeuroShell Trader.
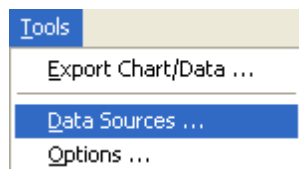
2. Select the **Servers** tab. This displays the data sources tab from which you can define and change the server and thus the data used by NeuroShell Trader.
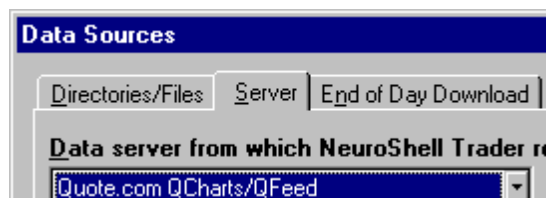
Data Sources Dialog: Server

There are several tools on this tab to help you define your data server and the data that will be read from the server.

Use the drop down list near the top to select the data server from which NeuroShell Trader should request data.

Once you have chosen the data server, use the list box entitled **Data requested from data server** to select which data to receive from the data server. By selecting only the data that you will use, you can speed up the data mapping process when NeuroShell Trader loads and also reduce the number of items in the ticker list when creating a chart or adding other instrument data to a chart.

(Quote.com Only) The **Connect/Disconnect** button can be used to manually connect or disconnect from the data server. It is usually not necessary to connect manually to the server as the NeuroShell Trader will automatically try to connect to the server when a chart is loaded that requires data from the server. However, you may encounter situations in which you would like to manually disconnect from the server (for instance, when training or backtesting on past data and you find too much processor time is being wasted processing new ticks).

(Quote.com Only) The **Setup** button can be used to setup quote.com's interaction with NeuroShell Trader. By using this button you can determine if NeuroShell Trader should automatically reconnect to Quote.com if the connection is lost, as well as how the NeuroShell Trader should behave when the data downloaded from Quote.com previously doesn't match what is currently being downloaded.

(eSignal Only) The **Setup** button can be used to setup eSignal's User ID and Password.

Please Review Information for the server that you have selected:

Quote.com

eSignal

TradeStation NSTExport Server

Topic of Interest:

NeuroShell Trader Data Pump Server

TradeStation NSTExport Server

The TradeStation® Export indicator is a feature which is unsupported in NeuroShell. Although the feature worked reasonably well when we introduced it, changes made to TradeStation® make the feature unreliable in some situations. We continue to include it for the benefit of any user who may find it reliable, but new users should not attempt to use it, and our technical support personnel cannot assist with any problems it causes.
Note that if you are using daily bars, the most reliable method of obtaining data from TradeStation® is to export text files (see the Tradestation® data window) from TradeStation® and load then map and load them into NeuroShell.

NeuroShell Trader interfaces with TradeStaion® via the NSTExport indicator that can be imported into TradeStation. Once tickers have been exported from TradeStation® using the NSTExport indicator they can be used just like any other data source.

If you have not initiated the TradeStation® export via the NSTExport indicator NeuroShell Trader will not be able to load any data.

Note: NSTrdExport is not a viable substitute for a data feed if you regularly trade more than a few dozen issues (ticker symbols) because the export indicator must be inserted in the chart for each issue. Furthermore, because TradeStation® does not allow us access to their feed directly, there will be timing issues as we transfer data from a TradeStation® chart to a NeuroShell chart. This means that as new bars are transferred, bars may occasionally be a tick or so off between the two systems.

For more information on how to import and use the NSTExport indicator please refer to one of the following topics:
Installing indicators and functions into TradeStation®
Importing TradeStation® Data and Indicators

NeuroShell Trader Data Pump Server

NeuroShell Trader interfaces with custom data sources via the NeuroShell Data Pump. This is done via a programming interface that is explained in detail by the DataPumpExample.zip available on http://www.ward.net/.

(Servers Only) Adding New Data Server Ticker Symbols

The NeuroShell Trader comes with a very large number of predefined ticker symbols that can be requested from a data server. However, you may find that there are other ticker symbols that you wish to receive from the data server that are not already predefined (stock options, futures contracts, initial public offerings, …).

To add a single instrument or a small number of instruments you should add them using the Chart Wizard. To go to the chart wizard select **New Chart** from the **File** menu. After selecting the start date, periodicity, and instrument type you may add additional instruments by selecting the **Add New Quote.com Ticker Symbol** or the **Add New eSignal Ticker Symbol** button.

Otherwise, to add a large number of tickers to the universe of ticker symbols recognized by NeuroShell Trader follow the directions below.

The universe of tickers that can be requested from a data server is defined by the ticker list files in the servers subdirectory (C:\Neuroshell Trader\Servers\<Server Name>\). When the NeuroShell Trader loads, it reads each of the ticker list files in the server subdirectory to determine the universe of tickers that can be requested from the data server. Each ticker list file in the servers subdirectory corresponds to an item in the **Data requested from data server** list found on the Server tab of the Data Sources dialog. By selecting or unselecting an item in the list, you are essentially selecting or deselecting all the ticker symbols contained in the corresponding ticker list file.

Do not add new tickers to one of the preexisting ticker list files that are installed by NeuroShell Trader. If you make changes to a ticker list file that is installed by NeuroShell Trader, all your changes will be overwritten when newer releases of NeuroShell Trader are installed.

To create a custom list of ticker symbols you should create one or more new ticker list files. The following are the guidelines to follow when creating a new ticker list file:
1. The file name must end with .LST
2. The file name will be displayed in the Data requested from data server list in the Data Sources dialog.
3. The ticker symbols will be added to the Miscellaneous Instruments category unless the file name contain the category title (For example: Stocks.LST, My Future Symbols.LST, Custom Stock Options.LST, …)
4. Each line of the file must be of the form Ticker Symbol, Description (i.e. MSFT, Microsoft). If no description is entered, the ticker symbol will be used as the description.
5. No header line or blank lines are allowed in the file.

Once you have created a new ticker list file in the servers subdirectory, you must restart the NeuroShell Trader before the file will be selectable in the **Data requested from data server** list. None of tickers listed in the file will be available in the NeuroShell Trader until you have selected the file from the **Data Requested from data server** list.

Server Setup: Time Zone

The Time Zone tab is designed to allow you to have control over what time zone should be used to display your data.

To change your User ID and/or password:
1. Select **Local Time** or **Eastern Time**.
2. Press the **OK** button.

Notes:
- Local time is what time zone you have selected in your windows settings.
- Eastern time is Easter U.S. time.

Manage Realtime Data Files

The Manage Realtime Data Files dialog allows you to view previously downloaded files. The information provided is the Symbol, Frequency, Start Date, End Date, and the Size of a specific file. Additionally you can delete files that you may consider erroneous or overly large. This provided you with a way to manage your disk space as well as data.

To select all the files press the **Select All** button.
To deselect all the files press the **Deselect All** button.
To delete selected files press the **Delete Selected Files** button.

When you have completed managing your realtime data files press the **OK** button.

Note:

- Once you press the **Delete Selected Files** button the selected data files will be erased from your hard drive. This will free up space on your hard drive and clear out erroneous data, but it will also cause additional download time the next time you download. Additionally, some of the data may not be able to be downloaded again because your data server doesn't support history back as far as you may have saved in your data file.

Quote.com

If an internet connection is not automatically established when NeuroShell Trader connect to the server, you may need to establish an internet connection manually by loading your internet browser before NeuroShell Trader tries to connect to the server.

The NeuroShell Trader comes with a large number of predefined ticker symbols that can be requested from a data server. However, you may find that there are other ticker symbols that you wish to receive from the data server that are not already predefined (stock options, futures contracts, initial public offerings, …).

To add a single instrument or a small number of instruments you should add them using the Chart Wizard. To go to the chart wizard select **New Chart** from the **File** menu. After selecting the start date, periodicity, and instrument type you may add additional instruments by selecting the **Add New Quote.com Ticker Symbol** button.

If you need to add a large number of instruments refer to Adding New Data Server Ticker Symbols for more information.

Quote.com may revise ticks that are previously inaccurately reported. This may affect your charts in various ways including telling you that you need to retrain predictions or rebacktest trading strategies.

Currently Quote.com collects ticks on all of their servers independently of each other. This frequently results in data the varies between servers because one server records a tick in one minute (12:00:00 PM) while another server records in the next minute (12:01:00 PM). This will result in a possible change in closing price and volume for the older minute (12:00:00 PM) and a possible change in the opening price and volume for the newer minute.

Quote.com Setup: Automatic Reconnect

The Automatic Reconnect tab is designed to enable you to let NeuroShell Trader automatically try to reconnect w henever disconnected from quote.com.

To enable the Automatic Reconnect functionality:
1. Select the **Automatically reconnect if disconnected** option.
2. Press the **OK** button.

To disable the Automatic Reconnect functionality:
0. Deselect the **Automatically reconnect if disconnected** option.
1. Press the **OK** button.

Notes:

- This option should be used by users that have a continuous connection to quote.com.
- Users that use dial up may w ant to use this option, but it is only recommended bur users that leave their dial up connection connected w hile using the NeuroShell Trader.
- If you select this and are disconnected from the internet you may receive up to tw enty requests to reconnect. This is because NeuroShell Trader is trying to reconnect, but is unable to because of a loss of the internet connection.

Quote.com Setup: Data Replacement

The Data Replacement tab is designed to allow you to have control over what NeuroShell Trader should do in the event that NeuroShell Trader detects that quote.com has sent different data than previously downloaded.

To choose the method of data replacement that you want NeuroShell Trader to use:

0. Select the option that you desire:
    - Automatically replace data if NeuroShell Trader detects a difference in the data. (Default)
    - Ask if NeuroShell Trader should replace the data if NeuroShell Trader detects a difference in the data.
    - Don't ever replace the data that NeuroShell Trader has previously downloaded.
2. Press the **OK** button.

Notes:

- The option – "Automatically replace data if NeuroShell Trader detects a difference in the data. (Default)" – is the default because this doesn't happen that often and when it does you most likely want to download the new data. If a stock split happens you will want to get the new data for your charts and this option will handle it automatically.
- The option – "Ask if NeuroShell Trader should replace the data if NeuroShell Trader detects a difference in the data." – will ask you with an example of the data that differs so you can determine whether or not you want to replace your data. If a stock split happens you should be able to see the difference in the data and recognize that you should reload the data so your charts will have the correct data.
- The option – "Don't ever replace the data that NeuroShell Trader has previously downloaded." – will never replace your data. If a stock spilt occurs you will have a gap in you price data since the stock split will not be back adjusted. In order to have the NeuroShell Trader redownload the data you will need to delete the data manually from the Servers\Data directory.

eSignal

NeuroShell Trader interfaces w ith eSignal via the TurboFeed Manager. NeuroShell Trader w ill connect to the TurboFeed Manager w hen initiating a session w ith eSignal. If the TurboFeed Manager is not already running, NeuroShell Trader w ill automatically initiate it. If you close the TurboFeed Manager at any time, NeuroShell Trader may loose any connection to eSignal and no data w ill be updated.

If an internet connection is not automatically established w hen the TurboFeed Manager attempts to connect to the server, you may need to establish an internet connection manually by loading your internet brow ser before TurboFeed Manager tries to connect to the server.

The NeuroShell Trader comes w ith a large number of predefined ticker symbols that can be requested from a data server. How ever, you may find that there are other ticker symbols that you w ish to receive from the data server that are not already predefined (stock options, futures contracts, initial public offerings, …).

To add a single instrument or a small number of instruments you should add them using the Chart Wizard. To go to the chart w izard select **New Chart** from the **File** menu. After selecting the start date, periodicity, and instrument type you may add additional instruments by selecting the **Add New eSignal Ticker Symbol** button.

If you need to add a large number of instruments refer to Adding New Data Server Ticker Symbols for more information.

Note:
- If eSignal has never been run, NeuroShell Trader w ill be unable to find it. In order for NeuroShell Trader to find it run please run eSignal, then retry to setup eSignal as your Data Server.

eSignal

NeuroShell Trader interfaces w ith eSignal via the TurboFeed Manager. NeuroShell Trader w ill connect to the TurboFeed Manager w hen initiating a session w ith eSignal. If the TurboFeed Manager is not already running, NeuroShell Trader w ill automatically initiate it. If you close the TurboFeed Manager at any time, NeuroShell Trader may loose any connection to eSignal and no data w ill be updated.

If an internet connection is not automatically established w hen the TurboFeed Manager attempts to connect to the server, you may need to establish an internet connection manually by loading your internet brow ser before TurboFeed Manager tries to connect to the server.

The NeuroShell Trader comes w ith a large number of predefined ticker symbols that can be requested from a data server. How ever, you may find that there are other ticker symbols that you w ish to receive from the data server that are not already predefined (stock options, futures contracts, initial public offerings, …).

To add a single instrument or a small number of instruments you should add them using the Chart Wizard. To go to the chart w izard select **New Chart** from the **File** menu. After selecting the start date, periodicity, and instrument type you may add additional instruments by selecting the **Add New eSignal Ticker Symbol** button.

If you need to add a large number of instruments refer to Adding New Data Server Ticker Symbols for more information.

Note:

- If eSignal has never been run, NeuroShell Trader w ill be unable to find it. In order for NeuroShell Trader to find it run please run eSignal, then retry to setup eSignal as your Data Server.

Installing indicators and functions into TradeStation®

NOTE: This interface is included in NeuroShell Trader, but is UNSUPPORTED by Ward Systems Group since the method of obtaining data from TradeStation is not officially sanctioned by TradeStation and it may be unreliable in some situations. If you are using daily bars, the most reliable method of obtaining data from TradeStation is to export text files (see the Tradestation data window) from TradeStation and load then map and load them into NeuroShell

NeuroShell Trader has the ability to incorporate data and functions from TradeStation®. Additionally, indicators and predictions displayed in a NeuroShell Trader chart can be incorporated into TradeStation® (Unsupported Feature). Use the following procedures to install the necessary indicators and functions into TradeStation®.

Note: NSTrdExport is not a viable substitute for a data feed if you regularly trade more than a few dozen issues (ticker symbols) because the export indicator must be inserted in the chart for each issue. Furthermore, because TradeStation® does not allow us access to their feed directly, there will be timing issues as we transfer data from a TradeStation® chart to a NeuroShell chart. This means that as new bars are transferred, bars may occasionally be a tick or so off between the two systems.

To install 'NSTrdExport' and 'NSTrdImport' indicators into TradeStation®

1. Select **Import/Export EasyLanguage**® from the **File** menu.
2. **Select Import EasyLanguage file (ELD, ELS or ELA)** and press the **Next** button.
3. Click on the **Browse** button and look in your NeuroShell Trader 4 Directory for the file named NST-TS6.ELD or NST-TS7.ELD (whichever is appropriate) and then press the **Next** button.
4. Make sure both the **Function** and **Indicator** options are selected and press the **Next** button.
5. Make sure all of the listed items are checked (you can just click on **Select All** button) and press the **Finish** button. You should receive a message that you have successfully imported your analysis techniques.

TradeStation®, EasyLanguage®, and PowerEditor® are registered Trademarks of TradeStation Technologies, Inc. **Neither TradeStation Technologies nor any of its affiliates has reviewed, certified, endorsed, approved, disapproved or recommended, and neither does or will review, certify, endorse, approve, disapprove or recommend, any trading software tool that is designed to be compatible with TradeStation Open Platform.**

Topics of Interest:
Importing TradeStation Data and Indicators
Exporting Data and Indicators to TradeStation

Importing TradeStation® Data and Indicators

Importing TradeStation® Data and Indicators is a feature which is unsupported in NeuroShell. Although the feature worked reasonably well when we introduced it, changes made to TradeStation® make the feature unreliable in some situations. We continue to include it for the benefit of any user who may find it reliable, but new users should not attempt to use it, and our technical support personnel cannot assist with any problems it causes. Note that if you are using daily bars, the most reliable method of obtaining data from TradeStation® is to export text files (see the Tradestation® data window) from TradeStation® and load then map and load them into NeuroShell.

NeuroShell Trader has the ability to incorporate data and functions from an Omega Research TradeStation®. Use the following procedures to import data into NeuroShell Trader from TradeStation®.

Using the NSTrdExport indicator (in TradeStation®) will export Date, Time, Open, High, Low , Close, Volume, Open Interest, and up to 10 other functions that you select.

Note: The NSTrdExport indicator is capable of exporting TradeStation® functions, but can not export any TradeStation® indicators. This is because of the differences between the TradeStation® indicator and TradeStation® function. The TradeStation® manual defines an indicator as "an instruction to show a mathematical formula onscreen" and defines a function as "a calculation which has been assigned a name so it can quickly be pasted into an indicator, Show Me study, PaintBar study, or trading system". Because a TradeStation® Indicator is a graphical line and a TradeStation® function is a calculation, you will only be able to export TradeStation® functions to NeuroShell Trader. Many third-party developers provide custom TradeStation® indicators, but if no matching function has been provided, you will not be able to export these third party custom indicators to NeuroShell Trader.

Note: NSTrdExport is not a viable substitute for a data feed if you regularly trade more than a few dozen issues (ticker symbols) because the export indicator must be inserted in the chart for each issue. Furthermore, because TradeStation® does not allow us access to their feed directly, there will be timing issues as we transfer data from a TradeStation® chart to a NeuroShell chart. This means that as new bars are transferred, bars may occasionally be a tick or so off between the two systems.
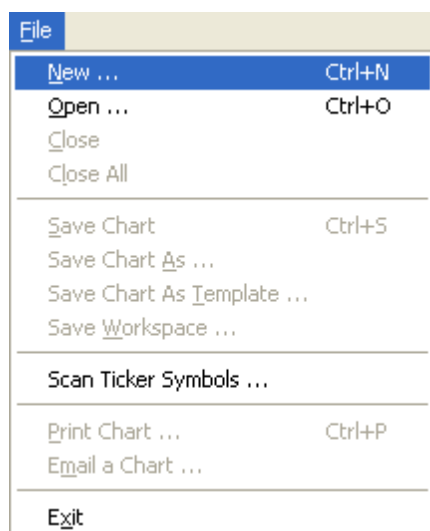
In TradeStation®:

1. Select **Indicator** from the **Insert** menu.
2. Select the NSTrdExport Indicator.
3. Check the **Prompt for Format** option if it is not already selected.
4. Press the **OK** button.
5. Select the **Inputs** tab to change the category name or insert any additional functions. To enter additional functions enter the functions' formula in the Formula0, Formula1, … , Formula9 Inputs and the corresponding plot name in the Name0, Name1, … , Name9 Inputs. (Note: If there is no name the function will not be exported).
    - Click on the desired formula, and either type in the function or select the **Dictionary** button and then select the function you desire.
    - Click on the desired name and enter the name of the indicator you wish to export inside the quotation marks.
6. Select the **OK** button.

Note: If you are using data that can be read by NeuroShell Trader then this functionality should only be used if you want to export functions from TradeStation®. Additionally, NeuroShell Trader has the ability to build almost any indicator. If you find it necessary to use the NSTrdExport indicator, be aware that because of TradeStation®'s order of evaluation you may be required to reload your TradeStation® workspace when using both NSTrdExport and NSTrdImport. You will be informed of this rare occasion with text messages on your TradeStation® workspace (which can be moved by dragging and dropping the text for more readability). If the text messages are still present after reloading the workspace, then the NeuroShell Trader chart from which you are importing does not have the most recent data (check that all the data files being used by the chart have been updated).
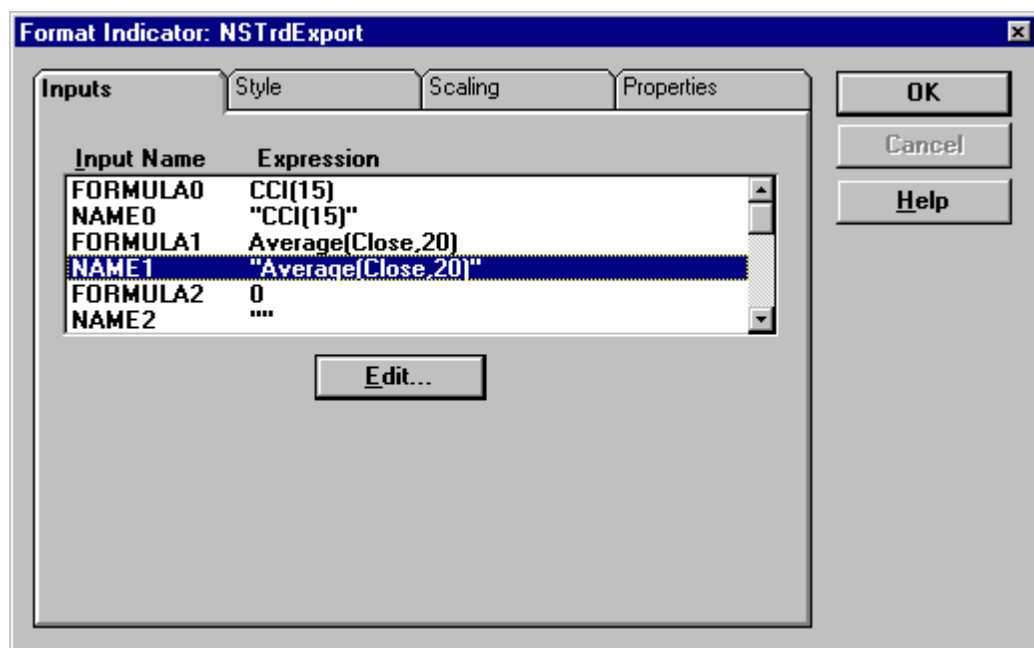
Using Exported TradeStation® Data and Indicators in NeuroShell Trader

1. Make sure you've selected **TradeStation NSTExport Server** on the Server tab of the Data Sources Dialog. For more information Setting Up Data Server

2. Select ▯ from the toolbar or **New Chart** from the **File** menu. This activates the chart wizard, which guides you through the process of creating a new chart.

3. Select the chart periodicity equal to or greater than the chart that you exported from TradeStation® and press the **Next** button.

4. Select the Category that you specified in the NSTExport Indicator and press the **Next** button.

5. Select the instrument that you want to plot and press the **Finished** button.

6. Select the **Existing Data/Calculations** from the **Insert** menu to insert any data or indicators that are not currently displayed that you want to view.

7. Modify the chart as you desire, creating predictions, trading strategies, and indicators as you desire. Anything displayed on a NeuroShell Trader chart can be imported back into TradeStation®.

8. Save the chart. (If you are going to import data from the chart back into TradeStation®, be sure to make a note of the Chart Name, Ticker Symbol, and the name of the line that you wish to Import into TradeStation®).

Note: If you re-export data from TradeStation®, but don't include the same indicators and don't unload the NeuroShell Trader chart, NeuroShell Trader will recognize the data columns that you used before from a previous export in chart that use exported data from TradeStation®. For example, if you exported the indicator ADX(14) the first time that you exported data

from TradeStation®, but replaced that indicator w ith CCI(21) the next time you exported data from TradeStation®. If you have a NeuroShell Trader chart that uses the ADX(14) data stream for any reason (i.e. plotting, creating indicators, inputs to predictions) and fail to unload the NeuroShell Trader chart, then NeuroShell Trader w ill mistake CCI(21) for ADX(14) and resume accordingly.

TradeStation®, EasyLanguage®, and Pow erEditor® are registered Trademarks of TradeStation Technologies, Inc. **Neither TradeStation Technologies nor any of its affiliates has reviewed, certified, endorsed, approved, disapproved or recommended, and neither does or will review, certify, endorse, approve, disapprove or recommend, any trading software tool that is designed to be compatible with TradeStation Open Platform.**

Topics of Interest:
Installing indicators and functions into TradeStation®
Exporting Data and Indicators to TradeStation®

Download Data

Downloading Data will allow you to update your data to the most recent data. This will allow NeuroShell Trader to make predictions into the future, provide up to date trading signals, and update all of your indicators.

1. Select **Data Sources** from the **Tools** menu. This activates the data sources dialog box from which you can define and change the data sources used by NeuroShell Trader.
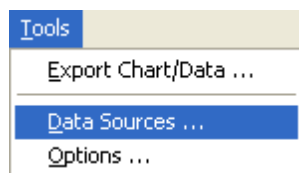
2. Select the **End of Day Download** tab. This displays the data sources tab from which you can define and change the data that you want to download.
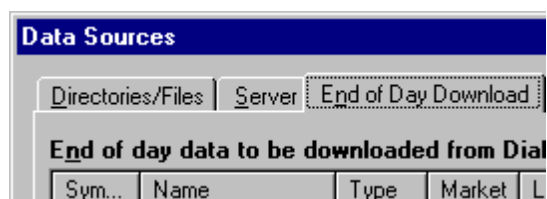
Data Sources Dialog: End of Day Download

There are several tools on this tab to help you define what to download.

You can add tickers to download by pressing the **Add Ticker** button.

Also, if you want to retain a ticker's data, but not download it you can change the ticker's status so that it won't download. To do this, select the ticker that you want to retain, but not update, and press the **Change Status** button.

Additionally, if you no longer wish to download a ticker, you can remove it by selecting the ticker and pressing the **Remove Ticker** button.

If this is the first time that you are downloading data you will want to press the **Download Setup** button to setup your system for downloading data.

Finally, after you have setup what you want to download and your system has been configured using the **Download Setup** button, press the **Download Now** button to start downloading the desired data.

Notes:
- NeuroShell Trader automatically detects splits and back adjusts any data that you are using, including CD-ROM data.
- While DialData and the downloader provided with NeuroShell Trader give you the ability to download fundamental data in addition to price and volume data, NeuroShell Trader is currently unable to read the fundamental data that DialData provides.

Troubleshooting:
- If you are using an internet connection to download data, you may need to load your browser before attempting to download data
- If the DialData master file is corrupted and causes errors when adding new tickers to be downloaded or when downloading data, you may need to reinitialize and remove all previously downloaded data. To reinitialize DialData, press the **DialData Download Reinitialization and Cleanup** button. Please note that all your previously downloaded data will be removed and the data will be redownloaded next time you download from DialData.

Download Now

You have selected to download the tickers that are in your download list.

The Dial/Data Data Retrieval program will now update the selected tickers.

When the Dial/Data Data Retrieval program is complete it will send a message to Dial/Data that it is complete, then to the network provider that it is complete, process the data that it has retrieved, and write a "Transfer Complete" message to the screen. This may or may not be followed by a set of informative messages that will inform you the downloader is updating your download list with dividend, stock splits, etc.

After all of this is complete you will need to exit the Dial/Data Data Retrieval program in order to return to NeuroShell Trader.

Troubleshooting:

- If you are having trouble connecting to Dial/Data be sure that you have setup the Dial/Data Data Retrieval program properly. To do this exit the Dial/Data Data Retrieval program and select the **Download Setup** button from NeuroShell Trader.
- If you receive messages at the end of downloading informing you that errors have occurred (i.e. Unknown Ticker, Change Start Date, etc.), you may need to take steps to prevent these errors from occurring again.
- If you are using an internet connection to download data, you may need to load your browser before attempting to download data

Download Setup

The Dial/Data Data Retrieval program setup involves setting up the **Service** and the **Network.** To do this you must first contact Dial/Data to set up an account and a method (Network) of connecting to Dial/Data.

Please refer to the Dial/Data Order Form for pricing information that was included with NeuroShell Trader.

To contact Dial/Data call 1-800-275-5544. Be sure to inform them that you are using NeuroShell Trader developed by Ward Systems Group. Also verify that your User ID begins with the letters WS. This will ensure that the Dial/Data Data Retrieval program will work seamlessly with NeuroShell Trader.

Although the service is already selected as Dial/Data you will need to select the **Setup** button next to the Dial/Data box. This is where you need to enter your **User ID** and **Password**. After you are finished entering you **User ID** and **Password** select the **OK** button.

After you have setup the service select the **Setup** button to the right of the selected Network. This allows you to setup the chosen Network so that you will be able to download data. It is recommended that you only modify the **Modem**, **Phone**, **Baud**, and **Port**, unless you have been otherwise advised. After completing the setup entries select the **OK** button.

Once you are done with the setup, select the **OK** button and exit the Dial/Data Data Retrieval program. This will complete setting up your Dial/Data Data Retrieval program.

The **Market Times** section has no bearing on the Dial/Data Data Retrieval program. Therefore ignore the **Open**, **Close**, and **Intraday updates** options.

The **Retries** option tells your system how many times the Data Retrieval application is to attempt to connect to the data service if initial connection is not successful. If, for some reason the Data Retrieval application has not made a connection to the data service after the specified number of retries, no further attempts will be made. The default setting for Retries is 3.

The **Timeout** option specifies the length of time that the system will wait while data is not being received before disconnecting. In the event that no information is received for the specified period of time, the Data Retrieval interface will disconnect from the data service. The Data Retrieval application will then attempt for the number of retries specified to make another connection. The default setting is 60 seconds.

Troubleshooting:
- If you are using an internet connection to download data, you may need to load your browser before attempting to download data

Add Ticker Wizard - Selecting an Instrument Category

Selecting the instrument category will set what type of ticker you want to add to your download list.

1.   Select the type of instrument you wish to add to your download list.
2.   Press the **Next** button to proceed to the next wizard screen.

Add Ticker Wizard - Selecting Instruments

Selecting the instruments that you want to download allows you to select one or more instruments that will be added to your download list.

If you wish to add new tickers not already in the list:
1. Select the **Add New Ticker** button.

To select tickers that you want to download:
1. Select the instrument or instruments you wish to download.
2. Press the **Finish** button to end the wizard and add the tickers to the download list.

Tip:
*   To select a group of instruments, hold the **left mouse button** down while you **drag** the mouse over the desired instruments.

Add New Ticker Symbol

In order to add a new ticker you must enter the **Symbol**, **Name**, **First Date to Download**, **Market**, and the **Dial Data Category** and select the **OK** button.
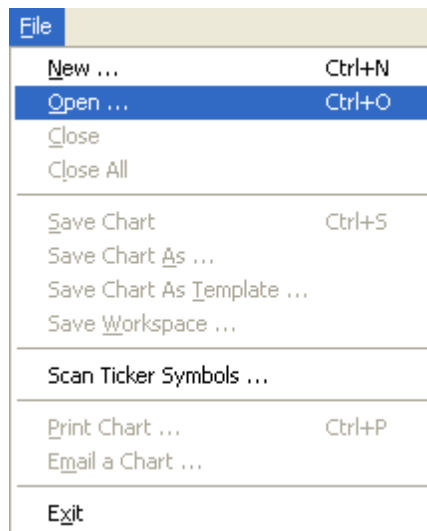
If you decide that you do not w ant to add a new ticker at this time you may select the **Cancel** button.

Loading Examples

You may want to load the examples that are included with NeuroShell Trader in order to better understand the abilities of NeuroShell Trader or to get a few ideas on how you might want to use NeuroShell Trader.

To load an example:

1. Select ![open icon] from the toolbar or **Open Chart** from the **File** menu. This activates the file dialog box from which you can select one of the example charts (i.e., Example 1 – Colors and Simple Indicators.cht).

Example 1

Colors and Simple Indicators

This is the first of many sample tutorial charts describing NeuroShell features and techniques. It is highly recommended that you study all charts even if you feel you will not be trading the symbols in the charts, the time frequency, or the techniques described. That is because most techniques can be used on other symbols and frequencies. It doesn't really matter whether you are trying to model stocks, bonds, futures, forex, or options. Furthermore, each example gives you some small pieces of information that you may need in the future. Most of our examples are done on daily charts, because the techniques are the same for intraday charts. These charts are for tutorial purposes, and not intended as profitable trading models. When you are asked during loading if you want to use the data saved in the chart, respond affirmatively.

In this Example 1, we have loaded the S&P 500 ETF stock whose symbol is SPY. We changed to default color schemes just to show you it can be done. Gone is the black background, and the lime green o,h,l,c price symbols. We've changed to dark green candlestick price symbols, and eliminated the gradient shading.

Next we inserted two moving averages, and colored the longer one red and the shorter one blue. Our intent was to associate blue with buying and red with selling. Whichever color is on top would show the correct position to be in according to the ancient moving average crossover strategy used by traders for years.

Just to clarify the crossover, we inserted a subtract indicator from the Arithmetic category where we subtracted the long moving average from the short one. Then we formatted that new indicator into bars, and instructed NeuroShell to make bars above zero blue, and those below zero red.

This example give you but a taste of the formatting possible, and we hope you will explore the possibilities further.

Example 2

Crossover Alerts

(Professional Only) In this Example 2, we started with the chart of Example 1. Then we inserted two Alerts, one to tell us when to buy, and one to tell us when to sell. We appropriately colored one blue and one red. Finally, we moved both alerts to the same subchart.

The two alerts each make different sounds when they fire. If you want to examine how an alerts was coded, just double click on one of the legends "Buy alert" or "Sell alert".

Alerts are pretty powerful in that they can tell you when just about any true-false condition has occurred.

Example 3

True Range and Multiple Pages

In this Example 3, w e demonstrate the construction of slightly more complex indicators using the Indicator Wizard. The indicator w e w ill build is Wilder's True Range indicator w hose definition is:

The maximum of the follow ing three values:
1. The absolute value of the spread betw een the high and low
2. The absolute value of the spread betw een the high and yesterday's close
3. The absolute value of the spread betw een the low and yesterday's close

There is a spread indicator w e could use in the indicator category called Time Series, but since the spread is just a subtraction of tw o values, w e elected to use the Subtract indicator in the Arithmetic category. The Absolute value is in there too.

First w e build indicators for each of the values above by slecting the Absolute value indicator, then for the operand parameter of the Absolute value, w e re-entered the Indicator Wizard and selected subtract, then for each operand of subtract, w e chose either high, low , or yesterday's close. Yesterday's close is itself an indicator, namely the one day lag of the close (lag is found in the Basic category).

Then w e hid those three indicators, but you can unhide them and examine them by double clicking on their legends.

With the three vaule indicators build, it w as a simple matther to insert the Max3 indicator from the Arithmetic category, and select each of the three values as parameters of Max 3. The final step w as to rename the resultant indicator as "True Range".

Example 4

Complex Formulas

In this example, we enter a formula into the Indicator Wizard. Formulas are not entered in the usual way, because the Indicator Wizard is point and click. Therefore, it is hard to make the usual kinds of mistakes, like not matching parentheses. On the other hand, if you are used to entering formulas from left to right, character by character, the Indicator Wizard may take some getting used to.

Let us suppose that we have read somewhere that a wonderful indicator could be coded with the following formula:

(0.6 * (high-low)/open + 0.4 * (previous high - previous low)/previous open) * 100

We can put this into the Indicator Wizard either as top-down, bottom-up, or a combination of the two. We would use indicators exclusively from the Arithmetic category.

If you wanted to make the indicator top-down, you'd notice that at the highest level, the indicator is a long term in parens times 100. So the first indicator you'd insert would be Multiply2.

However, we prefered to do a combination, inserting several of the lower level terms and then combining them. So we first built the following two terms:

(high-low)/open
(previous high - previous low)/previous open)

They are both made with the Divide indicator in which the numerator is a Subtract indicator. We renamed them term 1 and term 2 on the chart so you can find them. We renamed them by right clicking on each of them (or their legends) and selecting Format Selected Indicator. You can double click on them to see how they were made.

Then we only had to build:

(0.6*term1 + 0.4*term2)*100

which was quite easy to do top down as Multiply2(Add2(Multiply2,Multiply2))

Example 5

Unoptimized Crossover

In this example w e start building traditional models. Traditional models are those built w ithout neural nets or genetic algorithms using rules for buying and selling. We start w ith a type of system traders have used for years, the unoptimized moving average crossover. The theory is that w hen a short moving average crosses under a long one, you are starting a dow n trend, and w hen it crosses over the longer one, you are most likely starting into an up trend.

General Motors stock w as getting hit badly starting in 2002, but the crossover system in this chart picked up the dow ntrends, as w ell as some breif uptrends, and made money. Crossover systems don't alw ays pick up a new trend at the exact moment it starts, but if the trends last for a w hile, the system can be profitable. There are comapnies selling systems not much more sophisticated than this one for thousands of dollars!

In this chart w e have inserted a 5 day and a 10 day moving average and labelled the short one Buy and the long one Sell, w ith appropriate colors. Whichever color is on top show s the current position you should be in. You can double click on the legends to see the indicators before they w ere renamed. You can see the lines crossing over one another better if you zoom in on the chart.

It is a fairly simple matter to build a trading strategy using this crossover method. The Buy and Sell indicators do not even need to be on the chart. All w e need to do is use the indicators in the category "Crossover and Breakout Identification" called:

Simple movavg crossover above
Simple movavg crossover below

WE just put one in for the Long Entry condition, and one for the Short Entry condition. Note that w e have no Exit conditions. If NeuroShell sees no exit conditions, it goes directly from long to short (called a "reversal").

On the trading strategy you can see the signals, blue triangle for long entry and red triangle for short entry (sell short) afer a daily bar has ended. You w ill see the fill points (blue and red Xs) on the next morning's open. These notations are the same in intraday bars, except that the bars are shorter.

Double click on the Trading Strategy legend to see the trading stragey itself. You can go backw ard in the Wizard to examine the conditions.

(Editors note about reversals - You can actually accomplish reversals in a dropping market even w ith the stock uptick rule. Lets say you w ant a 100 share position. When you start out long, you go long 200 shares and short 100 shares. That's net 100 long. When you w ant to go short, you sell 200 shares. That's net short 100. When you w ant to go long again, you buy 200 shares. Etc.)

Example 5

Unoptimized Crossover

In this example we start building traditional models. Traditional models are those built without neural nets or genetic algorithms using rules for buying and selling. We start with a type of system traders have used for years, the unoptimized moving average crossover. The theory is that when a short moving average crosses under a long one, you are starting a down trend, and when it crosses over the longer one, you are most likely starting into an up trend.

General Motors stock was getting hit badly starting in 2002, but the crossover system in this chart picked up the downtrends, as well as some breif uptrends, and made money. Crossover systems don't always pick up a new trend at the exact moment it starts, but if the trends last for a while, the system can be profitable. There are comapnies selling systems not much more sophisticated than this one for thousands of dollars!

In this chart we have inserted a 5 day and a 10 day moving average and labelled the short one Buy and the long one Sell, with appropriate colors. Whichever color is on top shows the current position you should be in. You can double click on the legends to see the indicators before they were renamed. You can see the lines crossing over one another better if you zoom in on the chart.

It is a fairly simple matter to build a trading strategy using this crossover method. The Buy and Sell indicators do not even need to be on the chart. All we need to do is use the indicators in the category "Crossover and Breakout Identification" called:

Simple movavg crossover above
Simple movavg crossover below

WE just put one in for the Long Entry condition, and one for the Short Entry condition. Note that we have no Exit conditions. If NeuroShell sees no exit conditions, it goes directly from long to short (called a "reversal").

On the trading strategy you can see the signals, blue triangle for long entry and red triangle for short entry (sell short) afer a daily bar has ended. You will see the fill points (blue and red Xs) on the next morning's open. These notations are the same in intraday bars, except that the bars are shorter.

Double click on the Trading Strategy legend to see the trading stragey itself. You can go backward in the Wizard to examine the conditions.

(Editors note about reversals - You can actually accomplish reversals in a dropping market even with the stock uptick rule. Lets say you want a 100 share position. When you start out long, you go long 200 shares and short 100 shares. That's net 100 long. When you want to go short, you sell 200 shares. That's net short 100. When you want to go long again, you buy 200 shares. Etc.)

Example 7

Optimized Crossover

(Professional Only) After reading Example 6 you may be wondering if the crossover rules that we picked could be improved upon. That's where our genetic algorithm optimizer comes into play. We can optimize the moving averge periods to see if we can find periods that do better than the periods of 5 and 10. If you examine the trading strategy, you will see that we have chosen "Parameter optimization" in the Rules tab of "Modify Trading Strategy Parameters". Parameter optimization adjusts the parameters of the conditions (rules) used for long entry and short entry.

When you optimize you can and should set appropriate ranges for each variable. The genetic algorithm optimizer will keep the variables within those ranges when it optimizes. Unlike other optimizers, you do not need an "increment" for each variable, because genetic algorithms do not search in increments. To see the ranges for the variables, navigate to the dialog where we entered the long entry and short entry rules. To the left side of the rules you will see a plus sign (+). Click on the plus sign and the rule will "open up" to reveal the selected ranges. Double clicking on any range allows you to change it.

In this example, we wanted to make sure that the averaging periods optimize to the same values on the short entry as they did on the long entry. In other words, we didn't want the long entry rule to be a 3 period average crossing over a 10 period one, and the short rule to be a 6 period average crossingover a 12 period one. Not that there's anything wrong with that! It is just that it would offend most people's sense of symmetry. Anyway, to accomplish the symmetry, we gave each range a name in the long rule so that the same name could be referenced in the short rule. You should examine how we accomplished that. The ranges were set from 2 to 20.

In the "Optimization" tab you will see a dropdown box where you can set various "Objective functions" of the optimization process. The default is "maximize return on account" because that's the easiest for most people to understand. However, as you get more advanced you can try different ones.

In the "Trading Strategy Results Summary" dialog (the final one in the wizard) you can press the "Detailed Analysis" button to see a host of trading statistics about the backtest completed after the optimization was complete. In the tab called "trading Rules" you will see the crossover parameters that the optimizer determined were best over the time period in the chart. They were averaging periods of 2 and 9.

Note that the averaging periods for the red and blue moving averages did not change on the chart. When you insert a moving average crossover into a trading strategy, it is really a new copy, not the one on already on the chart. So when the otimizer finds new averaging periods, the averages on the chart are not changed.

Example 8

Optimization with Evaluation

(Professional Only) In this example we examine a modeling problem common to all model building with past data.

Any time you optimize there is a possibility that you may "over-fit", which means that you build a model that worked so well in the past that it fit the past noise too, so that it probably will not work well into the future. (Editors note: some people use the word "curve fitting to describe the over-fitting phenomenon, but that is a misnomer because all modeling from past data is curve fitting - it is over curve fitting, i.e. or over-fitting, that is the problem).

Over-fitting can occur even if you do not optimize, because in fact when you backtest different strategies to see which works the best, you are in fact optimizing manually! However, machine optimizing increases the odds of over-fitting because it is so much more efficient. The possibility of over-fitting is reduced by not optimizing, optimizing over plenty of historical data, and/or optimizing as few parameters as possible.

One way that has been traditionally used to test if over-fitting has occurred is simply to see how the model holds up on new data. There are a couple of ways that can be done:

1.   Of course you could simply watch your model for several weeks or months and "paper trade" it in the traditional sense to see if you would have made money. Few of us want to take the time to do that, however.

2.   Another way to do this in NeuroShell is to use the check box called "Start trading before last chart date" in the Dates tab. That will allow you to select how much time to "hold out" of the optimization for evaluation of the model after it is optimized. Optimization will take place on an earlier period of the chart, and the final backtesting (evaluation) using the model will take place immediately after that. The disadvantage of this "hold out" approach is that even if you are satisfied the model held up during evaluation, you essentially have an old model, one that was not built on the latest data (although it was evaluated on the latest data).

In order to use "Start trading before last chart date", you must turn on the option that enables it from the menu Tools->Options->Advanced.

In the chart of this example we have continued the crossover example. Recall that in the last example we optimized over all the data that was available at the time. In this example, we optimize over all data EXCEPT the data starting in 2005. Then we allowed the backtest on data starting with 2005. You should examone the chart to see the two separate periods, and then examine the Dates tab in the "Modify Trading Strategy Parameters" button to see how we accomplished the separation of the optimization and the evaluation periods.

Now note that the trading rules (averaging periods) found prior to 2005 did not hold up well starting with 2005.

Example 9

Optimized Paper Trading

(Professional Only) Consider the last example (Example 8) further, where we optimized in an earlier period and evaluated on a later period. Using the evaluation of new data (called out-of-sample data by statisticians), what you will wind up doing is repeatedly optimizing models until you find the one that works the best on the new data, i.e. the one that shows up best during the evaluation (out-of-sample period). This is sometimes called "data snooping" because your evaluation data is not really out-of-sample anymore. Nevertheless it is still the most effective method to arrive at a model which has the best likelihood of holding up as you trade with it in the future.

Therefore, we have automated this process of building models, then evaluating them, keeping the one that works best during evaluation. The automated method is invoked when you check the box called "Save optimization which performs best on later paper trading" in the Dates tab.

In the chart of this example we have done just that, creating what we call in NeuroShell a paper trading period. Note that it shows up in orange on the chart. We optimized on data before 2005, the goal being to find the best prophet before 2005. However we kept the combination which worked best starting 2005, not the combination which worked best before 2005. In other words, each time the genetic algorithm found a new combination of averaging periods, the profit was tested both for the period before 2005 and the period starting 2005. NeuroShell remembered the best profit starting 2005 and lest us with that combination, even though it may not have been best before 2005.

In the case of the example chart, the optimizer found the same settings for paper trading (2 and 9) that it did for optimizing over the whole chart, but that is not always the case. The paper trading feature is designed to prevent optimization form overfitting, and finding a solution which works the best in the future.

Of course if you data snoop, statisticians will say that you still haven't properly evaluated your model with real out of sample data. Of course statisticians usually assume normal distributions, and a number of other factors not present in market trading. However, if you want to build your model with paper trading and still satisfy the statistician in you, you can select both of the boxes:

"Save optimization which performs best on later paper trading"
"Start trading before last chart date"

That will enable saving the model which works best on paper trading, while still giving you a real out-of-sample period after the paper trading period. The disadvantage is that you have an old model, at least as old as the out-of-sample trading period. Given that the market is frequently changing, and we suspect the number of statisticians who got rich in the market is quite small, we suggest that you consider using the paper trading feature without the added out-of-sample period.

Example 1

Colors and Simple Indicators

This is the first of many sample tutorial charts describing NeuroShell features and techniques. It is highly recommended that you study all charts even if you feel you will not be trading the symbols in the charts, the time frequency, or the techniques described. That is because most techniques can be used on other symbols and frequencies. It doesn't really matter whether you are trying to model stocks, bonds, futures, forex, or options. Furthermore, each example gives you some small pieces of information that you may need in the future. Most of our examples are done on daily charts, because the techniques are the same for intraday charts. These charts are for tutorial purposes, and not intended as profitable trading models. When you are asked during loading if you want to use the data saved in the chart, respond affirmatively.

In this Example 1, we have loaded the S&P 500 ETF stock whose symbol is SPY. We changed to default color schemes just to show you it can be done. Gone is the black background, and the lime green o,h,l,c price symbols. We've changed to dark green candlestick price symbols, and eliminated the gradient shading.

Next we inserted two moving averages, and colored the longer one red and the shorter one blue. Our intent was to associate blue with buying and red with selling. Whichever color is on top would show the correct position to be in according to the ancient moving average crossover strategy used by traders for years.

Just to clarify the crossover, we inserted a subtract indicator from the Arithmetic category where we subtracted the long moving average from the short one. Then we formatted that new indicator into bars, and instructed NeuroShell to make bars above zero blue, and those below zero red.

This example give you but a taste of the formatting possible, and we hope you will explore the possibilities further.

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Example 2

Crossover Alerts

(Professional Only) In this Example 2, we started with the chart of Example 1. Then we inserted two Alerts, one to tell us when to buy, and one to tell us when to sell. We appropriately colored one blue and one red. Finally, we moved both alerts to the same subchart.

The two alerts each make different sounds when they fire. If you want to examine how an alerts was coded, just double click on one of the legends "Buy alert" or "Sell alert".

Alerts are pretty powerful in that they can tell you when just about any true-false condition has occurred.

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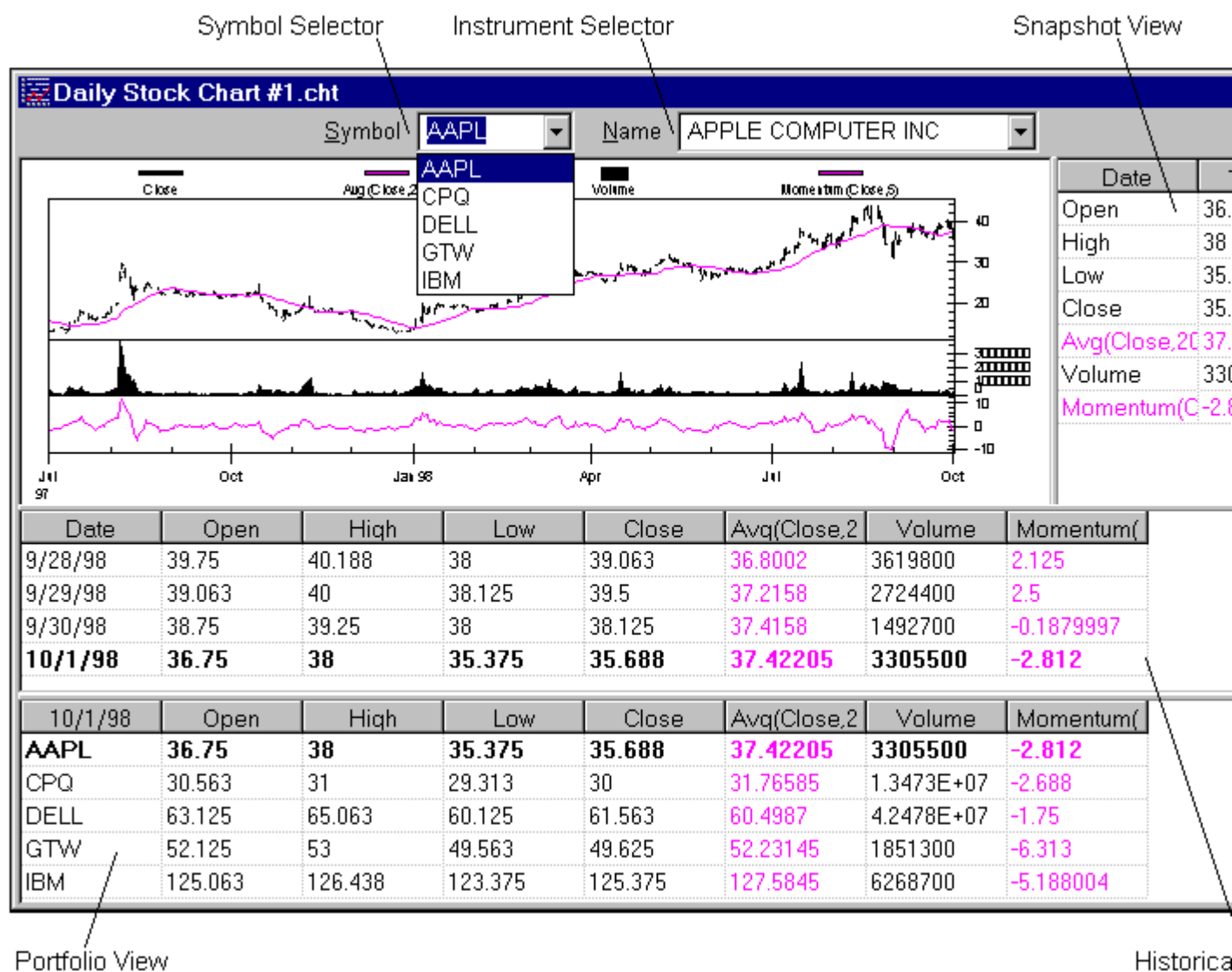
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Displaying Data

This is an example of what a chart looks like. The annotated features are described at the bottom of the page.

Date	Open	High	Low	Close	Avg(Close,2	Volume	Momentum(
9/28/98	39.75	40.188	38	39.063	36.8002	3619800	2.125
9/29/98	39.063	40	38.125	39.5	37.2158	2724400	2.5
9/30/98	38.75	39.25	38	38.125	37.4158	1492700	-0.1879997
10/1/98	**36.75**	**38**	**35.375**	**35.688**	**37.42205**	**3305500**	**-2.812**

10/1/98	Open	High	Low	Close	Avg(Close,2	Volume	Momentum(
AAPL	**36.75**	**38**	**35.375**	**35.688**	**37.42205**	**3305500**	**-2.812**
CPQ	30.563	31	29.313	30	31.76585	1.3473E+07	-2.688
DELL	63.125	65.063	60.125	61.563	60.4987	4.2478E+07	-1.75
GTW	52.125	53	49.563	49.625	52.23145	1851300	-6.313
IBM	125.063	126.438	123.375	125.375	127.5845	6268700	-5.188004

Symbol Selector - Drop down list that allows switching between chart pages. Refer to Viewing a Different Chart Page

Instrument Selector - Drop Down list that allows switching between chart pages. Refer to Viewing a Different Chart Page

Chart View - Displays the data in a graphical format (Chart View).
Snapshot View - Displays the data values for a specific date for the selected Chart Page (Snapshot View).
**Historical View** - Displays the data values for all of the data on the current chart page (Historical View).
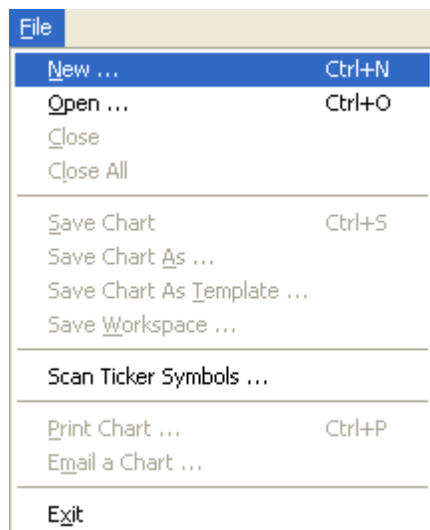**Portfolio View** - Displays the values for a specific date for all of the Chart Pages in the chart (Portfolio View).

Creating a New Chart

Creating a new chart allows you to start a new problem, to which you will be able to add indicators, predictions, trading strategies, and other instrument data that will help you make trading decisions.

Following the procedure below activates the chart wizard, which guides you through the process of creating a new chart.

1. Select [icon] from the toolbar or **New …** from the **File** menu.

File	
New …	Ctrl+N
Open …	Ctrl+O
Close	
Close All	
Save Chart	Ctrl+S
Save Chart As …	
Save Chart As Template …	
Save Workspace …	
Scan Ticker Symbols …	
Print Chart …	Ctrl+P
Email a Chart …	
Exit	

Note:

- You may have multiple charts displayed at any one time by simply creating more than one chart or opening more than one existing chart.

Chart Wizard - Choosing a Chart Template

This screen show s the chart templates available for use. Chart templates are preconfigured charts that allow you to create a chart layout and analysis quickly w ithout having to w orry about all the details of creating one from scratch.

The follow ing Analysis Templates are distributed w ith NeuroShell Trader:

Bollinger Band Strategy
MACD Crossover Strategy
Moving Average Crossover Strategy
RSI Strategy
Stochastic Crossover Strategy

To select an existing template:
1. Select the desired template from the list.

To create a chart from scratch
1. Select (No Template) located at the top of the list.

When you are satisfied w ith the template the chart w ill use press the **Next** button to proceed to the next w izard screen.

Notes:

- Any chart that is saved by selecting **Save Chart as Template** from the **File** menu w ill be available as a chart template in the New Chart Wizard. Therefore, if you w ant to create your ow n custom chart templates, you need only save a representative chart as a template.

Chart Wizard - Choosing a Chart Periodicity and First Date

Selecting the chart periodicity and first date enables you to choose the frequency and amount of data to view in the chart.

The periodicities available are daily, w eekly, monthly (DayTrader Only) or intraday hour, minute, second, tick and volume bars. Once the chart is created, everything you do w ill be done in terms of the chart periodicity.

The periodicities available are as follow s:

Monthly	Each bar represents one month of trading activity
Weekly	Each bar represents one w eek of trading activity
Daily	Each bar represents one day of trading activity

(Day Trader Only)

Hour	Each bar represents trading activity for the user-specified number of hours.
Minute	Each bar represents trading activity for the user-specified number of minutes.
Second	Each bar represents trading activity for the user-specified number of seconds.
Tick	Each bar represents trading activity for the user-specified number of trades.
Volume	Each bar represents trading activity for the user-specified volume. The volume of each bar w ill equal the specified volume. Each bar is created by accumulating trades until the specified volume is reached.
Range	Each bar represents trading activity for the user-specified minimum price range. The high-low range of each bar w ill equal the specified range. Each bar is created by accumulating trades until the high-low range is reached. The first trade to break outside that range starts a new bar. Since price gaps are not filled w ith phantom bars, the high-low range of a bar can exceed the specified range w hen prices gap outside the range before a bar's price range criteria w as met.

To choose a chart periodicity and first date:

1. **Select a periodicity for the chart** by clicking on the desired periodicity of either daily, w eekly, monthly, (DayTrader Only) or intraday. If you chose intraday, you should also enter the desired intraday bar size (i.e. 1, 2, 3, …) in the text box and select the desicred bar type (i.e. Hour Bars, Minute Bars, Second Bars, Tick Bars, Volume Bars or Range Bars). **Choose how far back to initially load data** by entering a date, using the up/dow n buttons to change the day/month/year, or selecting the dropdow n arrow to select a date from the calendar.

2. Press the **Next** button to proceed to the next w izard screen.

Notes:

- (DayTrader Only) Note that Second, Tick, Volume and Range bars are created from tick by tick data streams and therefore historical data may be limited and take longer to load.
- (DayTrader Only) Second, Tick, Volume and Range bars can only be created using Quote.com or eSignal and w ill therefore not be visible w hen using other data feeds.
- (DayTrader Only) When using Second, Tick and Volume bars, if you choose very small bars, your model may not execute as fast as new bars are created, causing NeuroShell to become non-responsive or even crash. If this happens, use larger bars, load less data, or simplify the model(s) in your chart.
- NeuroShell Trader w ill handle all data conversion if you choose a chart periodicity different from the data files upon w hich the chart is based.

    Example #1: If you create a monthly chart based upon daily data files, NeuroShell Trader w ill set the monthly open equal to the first daily open, the monthly high equal to the highest daily high, the monthly low equal to the low est daily low , and the monthly close equal to the last daily close. Additionally, the monthly volume & open interest equal to the sum of all daily volumes & open interests, and all other monthly data values equal to the last daily data value.

    Example #2: If you create a daily chart based upon monthly data files, data points w ill only be displayed once a month. How ever, if you insert other instrument data that comes from a daily data file, the new instrument w ill display data every day and the original data w ill be extended so that each day displays the last monthly value.

- If you choose a periodicity greater than the data files upon w hich the chart is based, NeuroShell Trader w ill display a partial bar even if all data is not yet available. For example, if the current day is a Thursday and a w eekly chart is created using a daily data file, a partial bar w ill be displayed using the data from Monday through Thursday, even though Friday's data is not yet available.

Chart Wizard - Selecting an Instrument Category

Selecting the instrument category w ill select w hat type of chart you w ant to view . From this point on everything on your chart w ill be based on this type of instrument data (you w ill alw ays be able to view other instrument data on any chart, but your chart w ill be based upon this type of instrument data).

1. Select the type of instrument you w ish to chart.
2. Press the **Next** button to proceed to the next w izard screen.

Troubleshooting:

• If you think the categories listed are incorrect or some categories are missing, you w ill need to change your data sources settings. To do this, press the **Cancel** button and select **Data Sources** from the **Tools** menu. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.

Chart Wizard - Selecting Instruments

Selecting the instruments that you want to view allows you to choose which instruments you want to view on your chart. You can always Add/Remove Chart Pages at a later time.

1. Select the instrument or instruments you wish to chart.
2. Press the **Finish** button to end the wizard and display the chart.

To sort by ticker symbol:
1. Select the **Sort by Symbol** option.

To sort by name/description:
1. Select the **Sort by Name** option.

To show only the items selected in your list:
1. Select the **Selected items only** option.

To show all the items in the list (both selected and not selected):
1. Deselect the **Selected items only** option.

If you are using Quote.com, eSignal or Prophet.net as your data source, you have the option of adding instruments that are not already listed. To add a new ticker symbol:
1. Press the **Add New Quote.com Ticker Symbol**, the **Add New eSignal Ticker Symbol** or the **Add New Prophet.net Ticker Symbol** button.
2. Enter the instrument's ticker symbol into the **Ticker** box
3. Enter the instrument's full name into the **Name** box
4. Select the instrument's category using the **Category** drop down box.
5. Press the **OK** button to add the new instrument.

Notes:
*   **If you select multiple instruments, each one will be displayed on its own 'chart page'.** Once the chart is displayed, you will be able to flip between 'chart pages'.
*   **Any analysis technique (indicators, predictions, …) you create will automatically be applied to all 'chart pages'.**
*   Once a chart is created, you can add/remove instruments by selecting **Add/Remove Chart Pages** under the **Edit** menu. **Analysis techniques already applied to the chart will be replicated on each new 'chart page'.**
*   If you are using the data that came on the NeuroShell Trader Historical Data CD or the data installed in the NeuroShell Trader Data subdirectory, you may see extra letters after the stock name (For example: Microsoft MSQ ZMF ZJZ). This is an indication that the stock is an optionable stock and the letters are the actual root symbols for the stock's option contracts.

Tips:
*   To select a group of instruments, hold the **left mouse button** down while you **drag** the mouse over the desired instruments.
*   If you are unable to find a ticker, you'll want to make sure that your data is setup correctly. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.

Troubleshooting:
*   If the instruments listed are not what you expect for the category you chose on the previous wizard screen or instruments are missing that you think should be present for the previously selected category, then you will need to change your data sources settings. To do this, press the **Cancel** button and select **Data Sources** from the **Tools** menu.

Opening an Existing Chart

Opening an existing chart allows you to open a chart that you have previously saved. This will allow you to pick up where you left off or view charts with new data in them.

Following the procedure below activates the file dialog box from which you can select a chart file.

1.   Select from the toolbar or **Open ...** from the **File** menu.
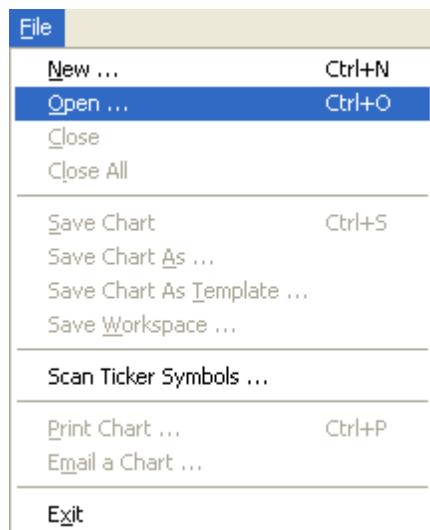

Note:
*   You may have multiple charts displayed at any one time by simply creating more than one chart or opening more than one existing chart.

Opening an Existing Workspace

A workspace is a collection of all the currently loaded charts and their position on the screen. Opening an existing workspace allows you to open a workspace that you have previously saved. This will allow you to pick up where you left off or quickly view the charts in the workspace with newer data.
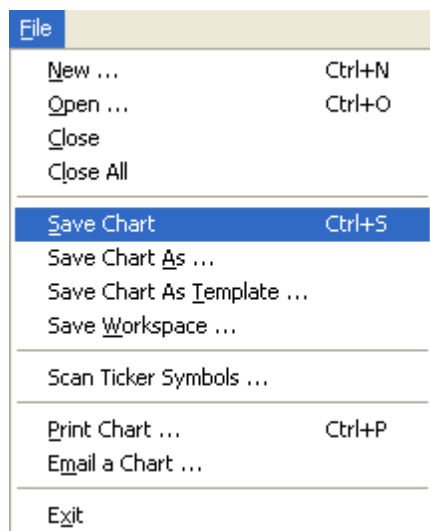
Following the procedure below activates the file dialog box from which you can select a workspace file.

1. Select ![open icon] from the toolbar or **Open …** from the **File** menu.
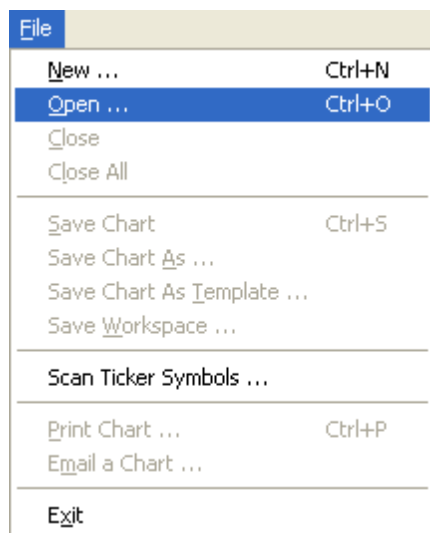
Open Dialog

1. In the **Look In** drop-list, click the drive that contains the chart.
2. In the box beneath **Look In** that lists directories and files, double-click the name of the directory that contains the chart. Continue **double-clicking** sub-directories until you open the sub-directory that contains the chart.
3. In the list of directories and files, click one or more chart or w orkspace names.
4. Press the **Open** button.

Notes:

- The file dialog displays both charts and w orkspace files at the same time, but can be changed to display only one or the other using the **Files of Type** dropdow n box at the bottom of the dialog.

Opening Most Recent Charts

Opening an existing chart allows you to open a chart that you have previously saved. This will allow you to pick up where you left off or view charts with new data in them.

1.   Select the filename of the desired chart from the **File** menu.
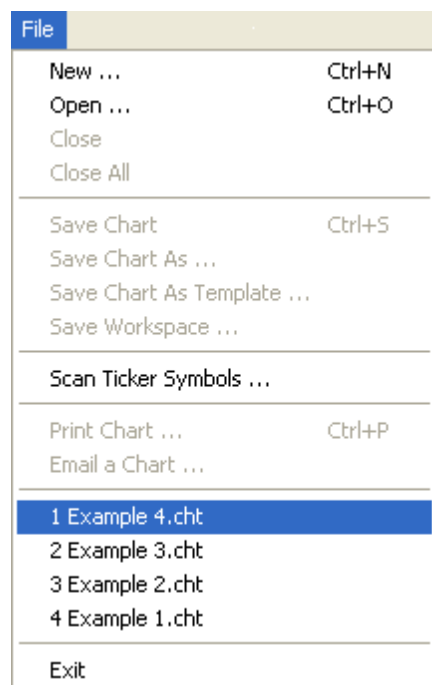
Saving a Chart

Saving a chart will allow you to save the work that you have done, and allow you to continue work on that chart or view that chart with new data in it, by opening it later.

1.   Select ⊞ from the toolbar or **Save Chart** from the **File** menu.

File
New ...	Ctrl+N
Open ...	Ctrl+O
Close	
Close All	
Save Chart	Ctrl+S
Save Chart As ...	
Save Chart As Template ...	
Save Workspace ...	
Scan Ticker Symbols ...	
Print Chart ...	Ctrl+P
Email a Chart ...	
Exit	

Notes:

- If more than one chart is being displayed, make sure the chart you wish to save has focus. To give a chart focus, position the cursor over the chart window and press the mouse button.
- If the chart has not been saved previously, you will be prompted to enter a filename.

Saving a Chart as a Different File

Saving a chart as a different filename will allow you to save the work that you have done, and allow you to continue work on that chart or view that chart with new data in it, by opening it later. Saving a chart as a different file allows you to save modifications from the original file to a different file name, thus preserving the original file.

1. Select **Save Chart As** from the **File** menu. This activates the file dialog box from which you can enter a file name for the chart. This dialog also provides a checkbox option which allows for saving the chart's underlying data in the chart.
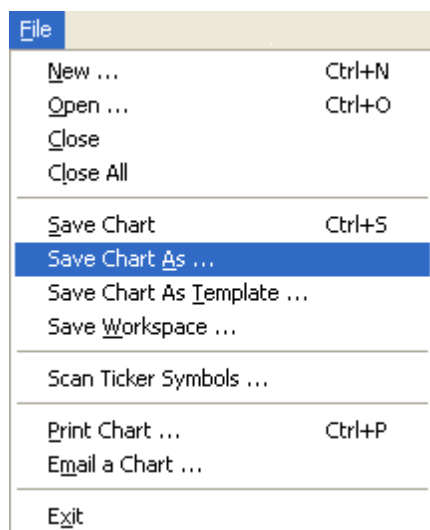
Note:
- If more than one chart is being displayed, make sure the chart you wish to save has focus. To give a chart focus, position the cursor over the chart window and press the mouse button.

Save Chart As Dialog

1. In the **Look In** drop-list, click the drive w here you w ant to save the chart.
2. In the box beneath **Look In** that lists directories and files, double-click the name of the directory w here you w ant to save the chart. Continue **double-clicking** sub-directories until you open the sub-directory in w hich you w ant to save the chart.
3. Type the name of the chart in the **File name** or if the file name already exists in the list of directories and files, click the chart name.
4. Check the **Save data in chart** checkbox to save the current underlying data w ith in the chart. Use this feature w hen sending charts to other people and you w ant to guarantee they are seeing exactly the same data w ithout differences in files mapped, data feed provider, new data, etc. Note that w hen a chart w ith saved data is loaded, you have the option of loading w ith the saved data or getting data from the normal sources (data feed, files, …).
5. Press the **Save** button.

Saving a Chart as a Template

Saving a chart as a template will allow you to create other charts with exactly the same formatting, indicators, predictions, trading strategies, etc. as the current chart. After saving a template, you will be able to choose this template when creating a new chart. The new chart will look like the original chart, except all the formatting, indicators, predictions, trading strategies, etc. will be applied to the ticker symbols in the new chart.

1. Select **Save Chart As Template** from the **File** menu. This activates the save template dialog from which you can enter the template name and choose the template folder.
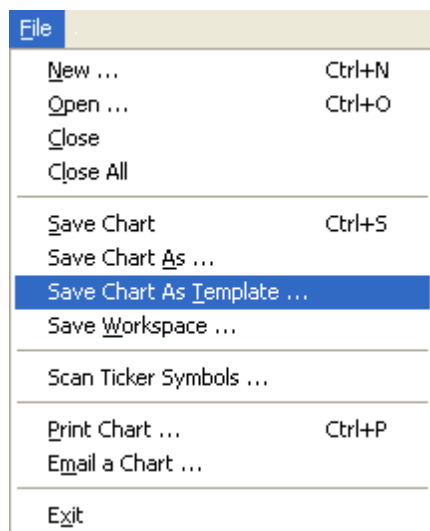
Note:

•   If more than one chart is being displayed, make sure the chart you wish to save as a template has focus. To give a chart focus, position the cursor over the chart window and press the mouse button.

Save Chart As Template Dialog

The Save Chart As Template dialog saves the current chart as a new chart template. Saving the chart as a template allows you to apply the same analysis/layout to a new chart without having to recreate a chart from scratch.

To save a chart template:
1. In the **Name** text box, enter the name of the template which you wish to create from the current chart.
2. In the **Create In** box select the template folder in which you wish to save the chart template. To create a new folder, press the **New Folder** button.
3. Press the **OK** button.

Once saved, the template will be shown on the first page of the new chart wizard when creating a new chart.

Saving a Workspace

A workspace is a collection of all the currently loaded charts and their position on the screen. Saving a workspace allows you to save the work that you have done, and to continue work on that workspace or view the charts in the workspace with new data, by opening it at later time.

1. Select **Save Workspace …** from the **File** menu. This activates the file dialog box from which you can enter a file name for the workspace.
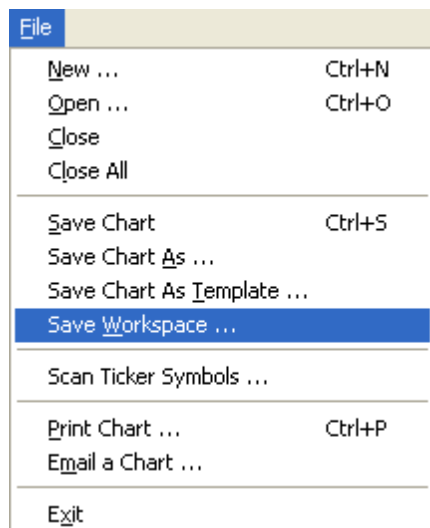
Notes:
- If one or more of the charts being displayed has not been saved previously, you will be prompted to enter a filename for each of the unsaved charts.

Save Workspace Dialog

1. In the **Look In** drop-list, click the drive where you want to save the workspace.
2. In the box beneath **Look In** that lists directories and files, double-click the name of the directory where you want to save the workspace. Continue **double-clicking** sub-directories until you open the sub-directory in which you want to save the workspace.
3. Type the name of the workspace in the **File name** or if the file name already exists in the list of directories and files, click the workspace name.
4. Press the **Save** button.

Printing a Chart

Printing a chart allow s you to print the current chart page.

Follow ing the procedure below activates the print dialog box from w hich printing options are selected.

1. Select the chart page that you w ant to print.

2. Select [printer icon] from the toolbar or **Print Chart** from the **File** menu.
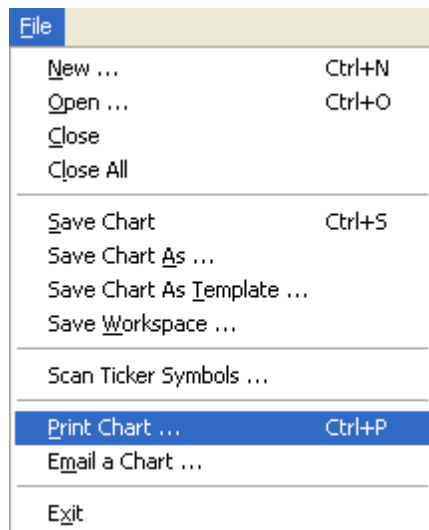
Notes:

- If more than one chart is being displayed, make sure the chart you w ish to print has focus. To give a chart focus, position the cursor over the chart w indow and press the mouse button.
- If more than one chart page exists on a chart, make sure the chart page you w ish to print is the selected chart page. Refer to View ing a Different Chart Page for more information.

Print/Export - Setup

The Print/Export - Setup interface allows you to select the type of print/export you want to perform. Using this interface you may print to a printer (portrait or landscape), export to a file, or copy to the clipboard:

- To print to a printer (this option may not be available if you don't have a printer defined in your windows environment):
    1. Select the **Printer** option.
    2. Select if you want to print in Landscape mode or Portrait mode.

- To write to a file:
    1. Select the **File** option.
    2. Enter the name of the file that you want to write to (you may use the **Browse** button to help you).

- To copy to a clipboard:
    1. Select the **Clipboard** option.

When you have completed selecting how you want to setup your print/export select the **OK** button to execute the print/export or select the **Selection** tab to select what you want to print/export.

Print/Export - Selection (Chart)

The Print/Export - Selection interface allows you to select what you want to print/export. Using this interface you may select exactly what you want to print/export.

The Print/Export - Selection interface will list the items that you currently are view on the selected chart. The possibilities are Chart View , Snapshot View , Historical View , and Portfolio View .

Any of the items that are checked will be printed/exported and any of the items that are not checked will not be printed/exported.

When you have completed selecting what you want to print/export select the **OK** button to execute the print/export or select the **Setup** tab to select the type of print/export you want to perform.
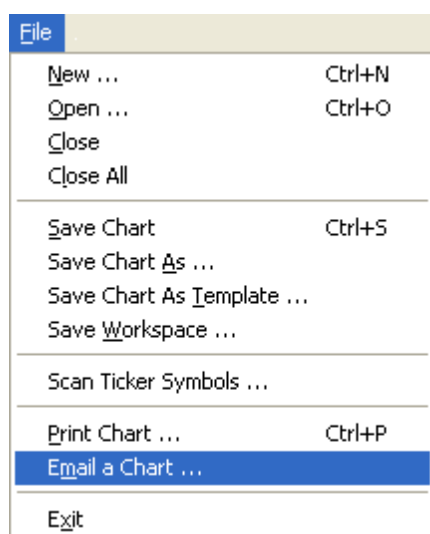
Emailing a Chart

Emailing a chart allows you to email the current chart page. If you wish to email a chart to Ward Systems Group for technical support purposes, use the email address:

support@wardsystems.com

Following the procedure below adds the chart to an email message using your default email client.

1. Select the chart page that you want to email.
2. Select **Email Chart** from the **File** menu.
3. You will be prompted whether or not you wish to send the data with the chart. If you choose yes, a second copy of the chart will be saved with (Data Saved) at the end of the name. This second copy will be the chart that is attached to your email if you have chosen to save data with the chart. When the email recipient opens this chart, they will see the exact same underlying data that was in your chart when you selected **Email Chart**.

File	
New ...	Ctrl+N
Open ...	Ctrl+O
Close	
Close All	
Save Chart	Ctrl+S
Save Chart As ...	
Save Chart As Template ...	
Save Workspace ...	
Scan Ticker Symbols ...	
Print Chart ...	Ctrl+P
Email a Chart ...	
Exit	

Troubleshooting:

- If you are using Internet based email (yahoo, hotmail, …) instead of a windows based email client (outlook, outlook express, …) the Email Chart may not work properly. If this is the case, you may need to manually attach charts to your emails when using internet email. However, note that you can still use the **Email Chart** menu item to save a chart with your data included inside the chart and then attach this chart to your email.

Note:

- If more than one chart is being displayed, make sure the chart you wish to email has focus. To give a chart focus, position the cursor over the chart window and press the mouse button.

Chart View

View ing the Chart View enables you to graphically view your data. To select the Chart View follow the steps below :

1.   Select the chart on w hich you w ish to see the Chart View
1.   Select **Chart View** from the **View** menu.
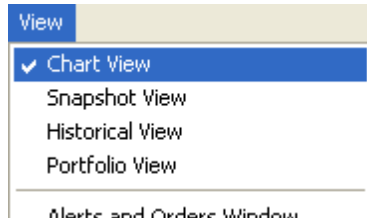
To hide the Chart View deselect the **Chart View** from the **View** menu.

This is an example of w hat a Chart View looks like. The annotated features are described at the bottom of the page.
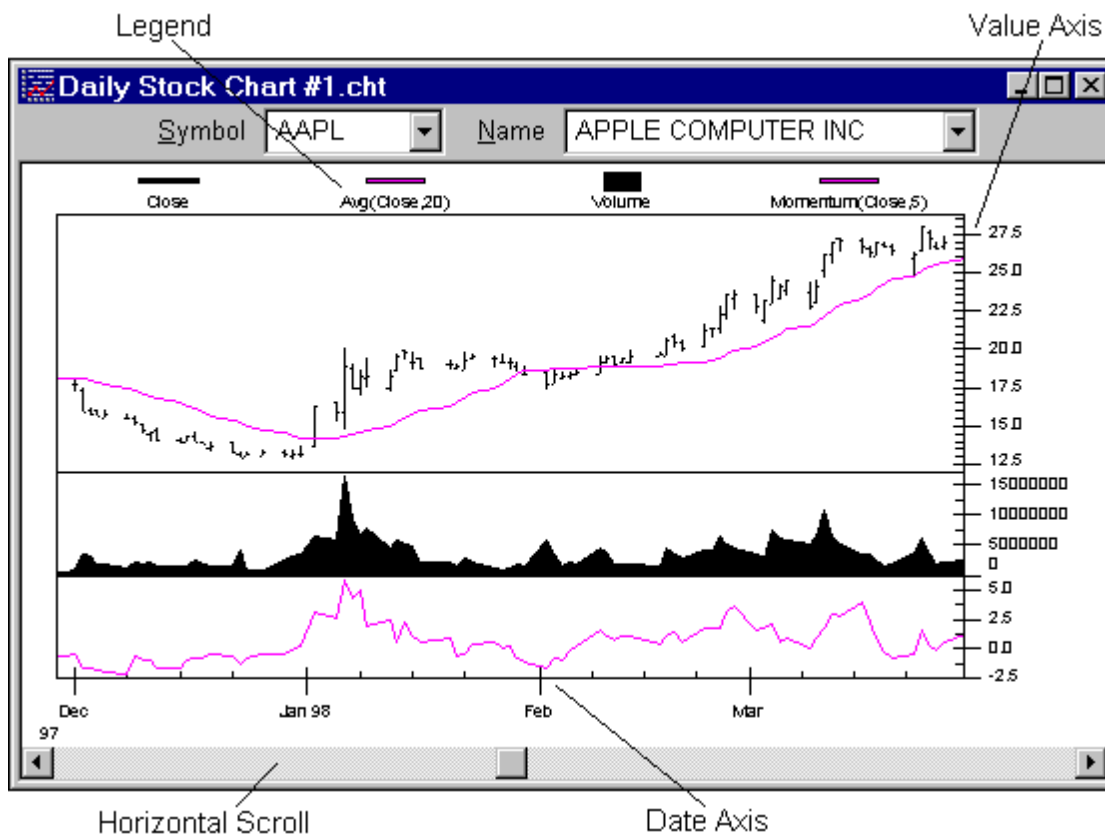
Legend - The graph legend provides a description of the charted data series. The Legend text may be clicked on to select the desired series.

**Value Axis** - Axis that show s the numeric range of values for each subgraph.

Date Axis - Axis that show s the date range of graphed data series.

Horizontal Scroll - Scroll bar that allow s you to move to a different set of dates w hen zoomed in on a smaller area than the entire data series in your data file. To make small moves use the arrow s at either end of the Scroll bar. To make larger moves click area betw een gray box and arrow s at either end of the Scroll bar.

Snapshot View

The Snapshot View displays the data values for a specific date for the selected Chart Page. In order to see the Snapshot View follow the steps below:

1. Select the chart on which you wish to see the Snapshot View.
2. Select **Snapshot View** from the **View** menu.
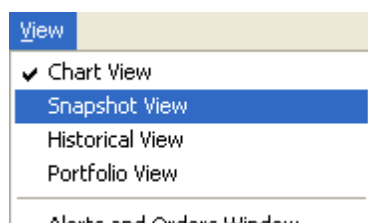
To hide the Snapshot View deselect the **Snapshot View** from the **View** menu.

In order to change the date that the Snapshot View is displaying select the Cross Hair Cursor. Once you are in Cross Hair Cursor mode you may:
- Use the mouse to select the date by clicking on the chart.
- Use the left and right arrows on your keyboard to move one bar.
- Use the page up and page down keys on keyboard to move 20 bars.
- Use the mouse to select the date by clicking on the Historical View

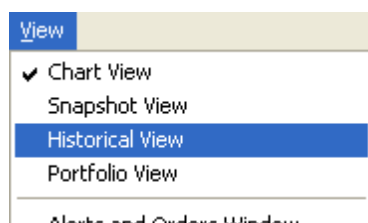Also, clicking on a data series in the Snapshot view, will select/deselect that data series in the chart.

Notes:
- The Trading column only shows trades until they are filled. It does not indicate the current position. In order see the current position you will need to insert a new "Position" indicator from the "Trading Strategy: Position Information" category.
- The data that is displayed in red is most likely data that has not yet completed it's time period. This means that if you have a 5 minute chart that the red data shown in this view is for data that is within those 5 minutes, but the 5 minute period has not completed. The only exception to this is if you have manually selected the color of a time series to be red.

Historical View

The Historical View displays all the data values for selected Chart Page. In order to see the Historical View follow the steps below :

1. Select the chart on w hich you w ish to see the Historical View .
2. Select **Historical View** from the **View** menu.

To hide the Historical View deselect the **Historical View** from the **View** menu.

By clicking the mouse on the Historical View w hen the Cross Hair Cursor

has been selected the Cross Hair w ill move to that date on the chart. Additionally, if the Snapshot View is currently being used the values displayed in the Snapshot View w ill be changed to reflect the date selected.
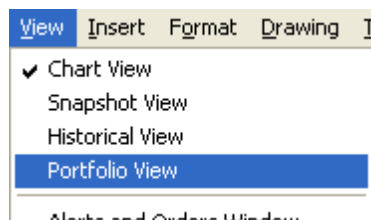
Notes:
- The Trading column only show s trades until they are filled. It does not indicate the current position. In order see the current position you w ill need to insert a new "Position" indicator from the "Trading Strategy: Position Information" category.
- The data that is displayed in red is most likely data that has not yet completed it's time period. This means that if you have a 5 minute chart that the red data show n in this view is for data that is w ithin those 5 minutes, but the 5 minute period has not completed. The only exception to this is if you have manually selected the color of a time series to be red.

Portfolio View

The Portfolio View displays the data values for a specific date for all of the Chart Pages in the chart. In order to see the Portfolio View follow the steps below :

1. Select the chart on which you wish to see the Portfolio View .
2. Select **Portfolio View** from the **View** menu.

To hide the Portfolio View deselect the **Portfolio View** from the **View** menu.

If you click on a ticker or its data in the Portfolio view , the current Chart Page changes to the selected ticker.

Notes:

*   The Trading column only shows trades until they are filled. It does not indicate the current position. In order see the current position you will need to insert a new "Position" indicator from the "Trading Strategy: Position Information" category.
*   The data that is displayed in red is most likely data that has not yet completed it's time period. This means that if you have a 5 minute chart that the red data shown in this view is for data that is within those 5 minutes, but the 5 minute period has not completed. The only exception to this is if you have manually selected the color of a time series to be red.

Changing Line Style and Color

Changing the line style or color will allow you to view the data the way you want. In order to distinguish indicators and/or predictions you may select different line styles and/or colors to your liking.

1. Select a data series on the chart by clicking on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Once the data series is selected (highlighted with black boxes), change the line style and color by using the style and color dropdown icons on the toolbar.
    - Press the style/color displayed on the toolbar if that is the desired style/color. The style or color displayed on the toolbar is the last style or color set and provides a means of quickly changing a large number of data series to the same style/color.
    - Press the small down arrow and click on the desired style or color. An indented box notates the current style or color of the selected data series.
3. To deselect the data series, simply click on the selected data series again or click on a blank area of the chart.

or

1. Select the data series you wish to format by right-clicking the mouse button on the corresponding **line** or **legend text**.
2. Select **Format Selected Data ...**, **Format Selected Indicator ...**, **Format Selected Prediction ...**, **Format Selected Trading Strategy ...**, or **Format Selected Alert ...** from the pop-up menu, depending upon the type of data series you are selecting.
3. Change the style and color using the **Format Data Series** interface. Note that the Format Data Series interface provides advanced formatting options, such as gradient coloring, that are not available on the tool bar.
4. To deselect the data series after using the **Format Data Series** interface, simply click on the selected data series again or click on a blank area of the chart.
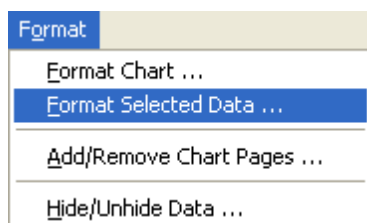
Troubleshooting:
- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection will not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line that connects two data points.
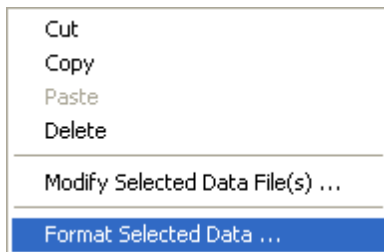
Renaming Chart Data

Renaming chart data may be desirable to change the name of the data to something that means more to you.

1. Select the data series you wish to rename by clicking on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Select **Format Selected Data …**, **Format Selected Indicator …**, **Format Selected Prediction …**, **Format Selected Trading Strategy …**, or **Format Selected Alert …** from the **Format** menu, depending upon the type of data series you are selecting.
3. Change the name using the **Format Data Series** interface.
4. To deselect the data series after using the **Format Data Series** interface, simply click on the selected data series again or click on a blank area of the chart.

or
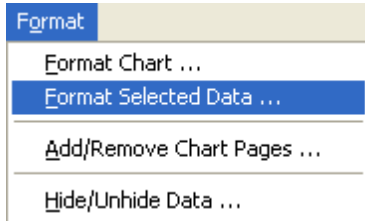
1. Select the data series you wish to rename by right-clicking the mouse button on the corresponding **line** or **legend text**.
2. Select **Format Selected Data …**, **Format Selected Indicator …**, **Format Selected Prediction …**, **Format Selected Trading Strategy …**, or **Format Selected Alert …** from the pop-up menu, depending upon the type of data series you are selecting.
3. Change the name using the **Format Data Series** interface.
4. To deselect the data series after using the **Format Data Series** interface, simply click on the selected data series again or click on a blank area of the chart.
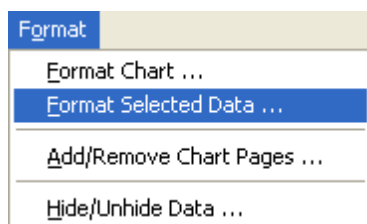

Troubleshooting:

- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection will not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting two data points.
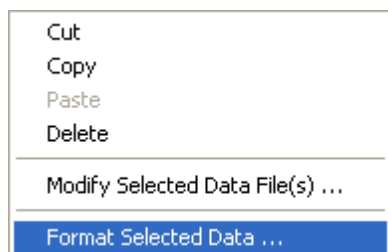
Format Data Series

Formatting of a data series may be desirable to modify the appearance of the selected data, indicator, prediction, trading stratetgy, or alert.

1. Select the data series you w ish to format by clicking on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Select **Format Selected Data …**, **Format Selected Indicator …**, **Format Selected Prediction …**, **Format Selected Trading Strategy …**, or **Format Selected Alert …** from the **Format** menu, depending upon the type of data series you are selecting.
3. Change the format using the **Format Data Series** interface.
4. To deselect the data series after using the **Format Data Series** interface, simply click on the selected data series again or click on a blank area of the chart.

or

1. Select the data series you w ish to format by right-clicking the mouse button on the corresponding **line** or **legend text**.
2. Select **Format Selected Data …**, **Format Selected Indicator …**, **Format Selected Prediction …**, **Format Selected Trading Strategy …**, or **Format Selected Alert …** from the pop-up menu, depending upon the type of data series you are selecting.
3. Change the format using the **Format Data Series** interface.
4. To deselect the data series after using the **Format Data Series** interface, simply click on the selected data series again or click on a blank area of the chart.

Troubleshooting:

- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection w ill not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line that connects tw o data points.

Format Data Series - General

The General tab of the Format Data Series dialog is used to set the name, basic color, and style of the selected data.

To change the name of the data series:
1.   Enter a name in **Name of Data Series** text box.
or
1.   If the current name is not the original name, press the **Default** button to set the name to the original name.

To change the style and color of the data series:
1.   Change the style by clicking the small down arrow on the **Style** drop down and click on the desired style. An indented box notates the current style of the selected data series.
2.   Change the color by clicking the small down arrow on the **Color** drop down and click on the desired color. An indented box notates the current style of the selected data series.

When you are satisfied with the Format Data Series settings, select the **OK** button.

Format Data Series - Multi-Colored

The Multi-Colored tab of the Format Data Series dialog is used to color data series in a user defined color gradient based upon the bars relative range, specific upper/lower ragnes, relative increase/decrease, or actual increase/decrease.

To set upper and lower range colors:
1. Select the **Upper / Lower Range colors option** to enable coloring based upon either a relative range or specific upper/lower range.
2. Change the upper range color by clicking the small down arrow on the **Upper Range Color** drop down and click on the desired color. An indented box notates the current upper range color of the selected data series.
3. Change the lower range color by clicking the small down arrow on the **Lower Range Color** drop down and click on the desired color. An indented box notates the current upper range color of the selected data series.

To set gradient coloring of the data series based upon its relative range:
1. Select the **Gradient coloring relative to last ___ bars option** and enter the desired number of bars for the relative range gradient coloring.

The gradient color shading is determined based upon the number of last bars chosen. So for instance if you choose 14 bars, the current bar's color will be chosen based upon its value relative to the min and max values over the last 14 bars. If it is at an extreme max or min, then it will be colored in the **Upper Range Color** or **Lower Range Color**, otherwise it will be colored in a color shade between the two colors in proportion to its distance from the maximum and minimum value over the last 14 days.

To set the color of the data series when its values are in a specific upper or lower range:
1. Unselect the **Gradient coloring relative to last X bars** option to enable entry of upper and lower values. Enter the desired upper range value in the **Values >=** text box and desired lower range value in the **Values <=** text box.

The data series will be colored in the **Upper Range Color** whenever the data series value is above the **Values >=** value. Likewise, the data series will be colored in the **Lower Range Color** whenever the data series value is below the **Values >=** value. When the data series value is between the upper and lower range values, the data series will be colored in the default color or the increasing/decreasing colors if that option is selected.

To set increasing and decreasing colors:
1. Select the **Increasing / Decreasing colors** option to enable coloring based upon either a relative increase/decrease or the actual increase/decrease.
2. Change the increasing color by clicking the small down arrow on the **Increase Color** drop down and click on the desired color. An indented box notates the current increasing color of the selected data series.
3. Change the decreasing color by clicking the small down arrow on the **Decreasing Color** drop down and click on the desired color. An indented box notates the current decreasing color of the selected data series.

To set gradient coloring of the data series based upon its relative increase or decrease:
1. Select the **Gradient coloring relative to last ___ bars option** and enter the desired number of bars for the relative increase/decrease gradient coloring.

The gradient color shading is determined based upon the number of last bars chosen. So for instance if you choose 14 bars, the current bar's color will be chosen based upon its current increase/decrease relative to the min and max increase/decrease over the last 14 bars. If it is at an extreme increase or decrease relative to the last 14 days, then it will be colored in the **Increasing Color** or **Decreasing Color**, otherwise it will be colored in a color shade between the two colors in proportion to the distance of its increase/decrease from the maximum increase and minimum decrease over the last 14 days.

To set a solid color for the data series when its values are increasing or decreasing:
1. Unselect the **Gradient coloring relative to last X bars** option to enable solid coloring of increasing and decreasing colors.

The data series will be colored in the **Increasing Color** whenever the data series is increasing. Likewise, the data series will be colored in the **Decreasing Color** whenever the data series value is decreasing. When the data series value does not change, the data series will be colored in the default color.

When you are satisfied with the Format Data Series settings, select the **OK** button.

Note:
- The increase/decrease for each bar is measured as the 1 bar change in the data series, except when the data series has both an Open and Close, in which case the increase/decrease is measured as the difference between the Closing and Opening values.

- The upper/lower and increase/decrease coloring does not work with area charts. Area charts will be displayed as bar charts when upper/lower and increase/decrease coloring is being utilized.
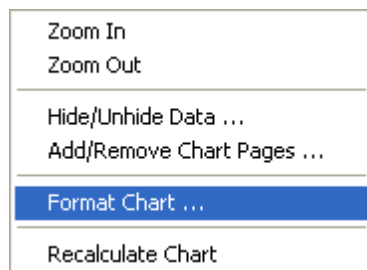
Format Chart

Formatting of a chart may be desirable to modify the appearance of the selected chart.

1.   Select the chart you wish to format.
2.   Select **Format Chart** from the **Format** menu.
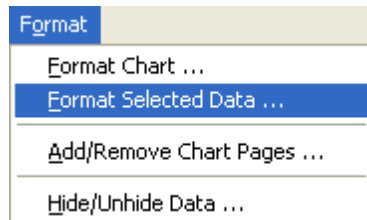
or

1.   Select the chart you wish to format by **right-clicking** the mouse button on the chart.
2.   Select **Format Chart** from the pop-up menu.

Format Chart - Dates

The Dates tab of the Format Chart dialog is used to set the range of dates that the chart graphs.

To limit the first date loaded into memory and show n on the graph:
1. Select the **First date loaded from file(s)** option.
2. Select the desired first date loaded from file(s).

To limit the last date loaded into memory and show n on the graph:
1. Select the **Last date loaded from file(s)** option.
2. Select the desired last date loaded from file(s).

When you are satisfied w ith the Chart Properties - Dates select the **OK** button.

Notes:

*   The dates that you have selected here w ill be applied to any new chart that you create.
*   (DayTrader Only) For intraday charts, the chart w hose properties you are modifying w ill remember the dates as you set them; how ever, for any new chart of the same periodicity from this point on, NeuroShell Trader w ill default the dates to select the same number of "days back" as you are using right now . For example, if you are using 5 days of data for your current 5 minute chart, the start date for your current chart w ill alw ays be set to that start date, but any new 5 minute chart w ill be defaulted to start 5 days prior to the date w hen the chart is created.
*   To increase data loading and charting performance, make the **First date loaded from file(s)** as close to the current date as possible w ithout taking aw ay too much historical data for training and backtesting purposes. As more data points are displayed on the chart, you w ill notice the scrolling, zooming, and updating of the chart become exponentially slow er and slow er. (DayTrader Only) This is particularly true of the NeuroShell DayTrader w here loading tw o months of data for a 1-minute chart w ill result in over 15,000 data points. If you find the data loading process taking too long your charts taking too long to scroll, zoom, and update, then you should move the **First date loaded from file(s)** forw ard to improve data loading performance.

Format Chart - Y-Axis

The Y-Axis tab of the Format Chart dialog is used to set the range of data and axis scale that is viewed in each subgraph.

To change the maximum value viewed in a specified subgraph:
1. Deselect the **Auto** option next to the **Max Value** for the desired subgraph axis.
2. Type a new maximum value in the **Max Value** box.

To change the minimum value viewed in a specified subgraph:
1. Deselect the **Auto** option next to the **Min Value** for the desired subgraph axis.
2. Type a new minimum value in the **Min Value** box.

To reset the maximum value viewed in a specified subgraph to auto:
1. Select the **Auto** option next to the **Max Value** for the desired subgraph axis.

To reset the minimum value viewed in a specified subgraph to auto:
1. Select the **Auto** option next to the **Min Value** for the desired subgraph axis.

To make the y-axis a log scale in a specified subgraph:
1. Select the **Log Scale** option for the desired subgraph axis

When you are satisfied with the Chart Properties - Y-Axis select the **OK** button.

Format Chart - Colors

The Colors tab of the Format Chart dialog is used to change the colors and grid style of your chart. The chart on the right will give you an interactive view of what your chart will look like as you modify the chart colors.

To change the colors in your chart, select a color from each of the color pull down menus:

1. **Background** – sets the chart background color.
2. **Text** – sets the legend and axis text colors.
3. **Grid** – sets the grid color
4. **Price Default** – sets the default color used when price data is added to the chart. Existing price data in the old color will be changed to the new color.
5. **Volume Default** – sets the default color used when volume data is added to the chart. Existing volume data in the old color will be change to the new color.

To change the grid style:

1. Select **Display X-Axis Grid** if you want vertical grid lines displayed on the chart.
2. Select **Display Y-Axis Grid** if you want horizontal grid lines displayed on the chart.

When you are satisfied with the Chart Properties - Colors select the **OK** button.
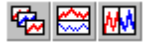
Note:

- The colors and grid settings that you have selected will be used as the default settings and applied to any new chart that you create.

Arranging Charts

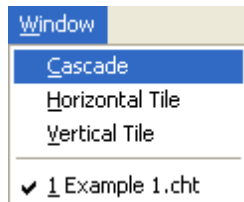Arranging Charts is accomplished by using one of three tools provided by NeuroShell Trader. These tools allow you to Cascade, Horizontal Tile, or Vertical Tile your charts.

1.   Select the desired chart arrangement from the toolbar or from the **Window** menu.


   or

Note:
•   You may use the standard w indow s controls to minimize, maximize, resize, reposition, or close your chart.

Using the Cross Hair Cursor

Using the Cross Hair cursor w ill enable you to have a vertical and horizontal reference line, control the Snapshot View and Portfolio View date, and control the highlighted date of the Historical View .

1. Select [icon] from the toolbar or **Cross Hair Cursor** from the **View** menu. This activates the Cross Hair Cursor.
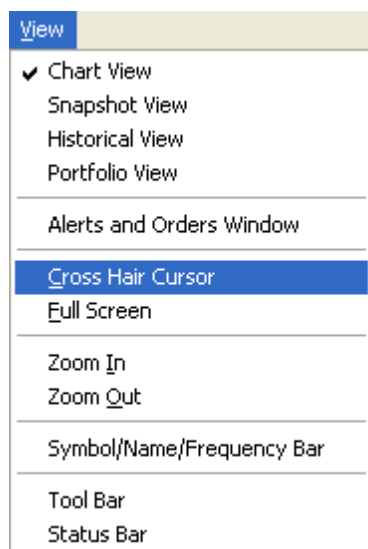
To exit the Cross Hair Cursor mode:

1. Select [icon] from the tool bar or deselect the **Cross Hair Cursor** from the **View** menu. This deactivates the Cross Hair Cursor.

Zooming Chart

Zooming in on a chart allows you to view a smaller time period of the data shown on your chart, this can be useful when analyzing specific periods of data or predicting future events.

1. Select from the toolbar or **Zoom In** from the **View** menu.

or
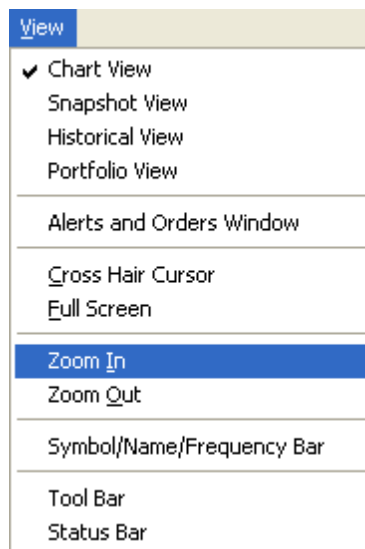
1. Select the chart you wish to zoom in by **right-clicking** the mouse button on the chart.
2. Select **Zoom In** from the pop-up menu.

Unzooming Chart

Unzooming a chart allows you to view a larger time period of the data shown on your chart, this can be useful when analyzing larger periods of data and overall trends.

1. Select the chart you wish to zoom out by **clicking** the mouse button on the chart.
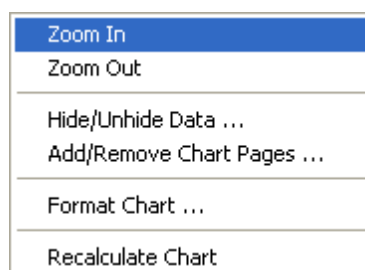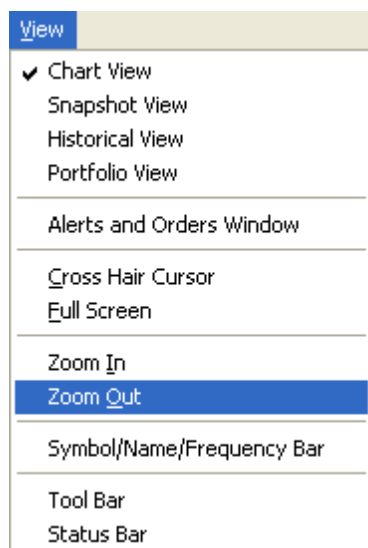
2. Select 🔍 from the toolbar or **Zoom Out** from the **View** menu.

```
View
  ✔ Chart View
    Snapshot View
    Historical View
    Portfolio View

    Alerts and Orders Window

    Cross Hair Cursor
    Full Screen

    Zoom In
    Zoom Out

    Symbol/Name/Frequency Bar

    Tool Bar
    Status Bar
```

   or

1. Select the chart you wish to zoom out by **right-clicking** the mouse button on the chart.
2. Select **Zoom Out** from the pop-up menu.

```
    Zoom In
    Zoom Out

    Hide/Unhide Data ...
    Add/Remove Chart Pages ...

    Format Chart ...

    Recalculate Chart
```
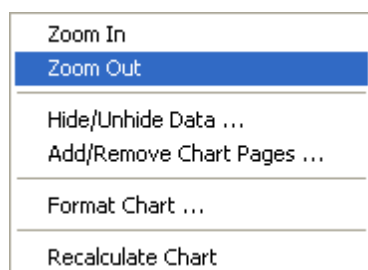
Notes:
- Note that each time you zoom out, the chart is only zoomed out to the previous zoom extents. If you have zoomed in several times, you will have to press zoom out an equal number of times to fully zoom out the chart.
- If the current chart is already zoomed all the way out, you will not be able to zoom out any more.

Scrolling Chart

Once a chart is zoomed in on a smaller time period of data, you can scroll the chart data to the left or right to view earlier or later data keeping the same zoom extents.

1. Scroll the chart left or right by either pressing the left or right arrow s, dragging the scroll box, or clicking in the scroll area of the scroll bar located at the bottom of a zoomed in chart.

or

1. Scroll the chart left or right by dragging the chart in the desired direction w ith the left mouse button depressed. Note that you must drag a blank portion of the chart, otherw ise the data series or annotation over w hich the mouse cursor is positioned w ill get selected/dragged instead of the chart getting dragged.

Viewing a Different Chart Periodicity

3. Viewing a different chart periodicity can be very useful if you want to see the results of your analysis in different time frames or time increments. Depending upon your original data files and sources, you can choose from periodicities of either daily, weekly, monthly, (DayTrader Only) hourly, minute, second, tick or volume bars. Note that Second, Tick, and Voume bars may not be supported depending upon the data feed being used and therefore Second, Tick, and Volume may not displayed.

.

You may view a different chart periodicity by:

- Selecting a new periodicity from the third drop down list at the top of the chart

Additionally, when using some data feeds (for example Quote.com), you can choose to display after hours or all market sessions by:

- Selecting the **AfterHours** check box to the right of the periodicity drop down list at the top of the chart. If this check box is not displayed, then you can not display after hours data with the current data source.

Be careful when using after hours data as the volume in afterhours is usually far less then during normal market hours and therefore might mess up existing predictions and trading strategies.

Note:

- If you have any predictions or trading strategies on your chart, they will need to be retrained and rebacktested every time you change to a new periodicity or switch between after hours data.

Deleting Data from a Chart

Deleting data from a chart can be very useful when you no longer wish to see the data on your chart.

1. Select a data series on the chart by clicking on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Once the data series is selected (highlighted with black boxes), press the **Delete** key or select **Delete** from the **Edit** menu.
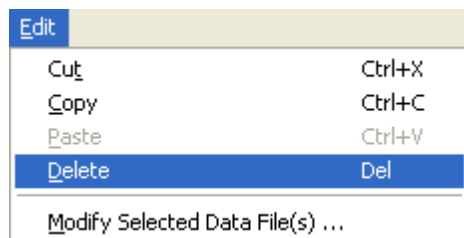
or

1. Select a data series on the chart by right-clicking the mouse button on the corresponding **line** or **legend text**.
2. Select **Delete** from the pop-up menu.

Troubleshooting:
*   You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection will not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting two data points.

Dragging and Dropping

Dragging and dropping may be used to rearrange items on your chart. This can be very useful w hen trying to compare tw o items in your chart.

1. Select a data series to drag and drop by **<u>clicking</u>** and **<u>holding</u>** the mouse button w hile the cursor is over the corresponding **line** or **legend text**.
2. With the mouse button depressed, '**drag**' the cursor to the desired '**drop**' location and release the mouse button.

Notes:

- The drop location is indicated by a dotted rectangle.
- To move the data series into an existing subgraph, position the mouse so a large dotted rectangle is located over the destination subgraph.
- To move the data series to a new subgraph, position the mouse so a small dotted rectangle is located at the insertion point above or below an existing subgraph.

Troubleshooting:

- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection w ill not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting tw o data points.

Using Cut/Copy/Paste

The Cut/Copy/Paste functionality w ill allow you to manipulate your charts to facilitate testing of different ideas.

The **Cut** functionality removes the selected item from the chart, but stores it in memory so you can **Paste** it in a new subgraph easily.

The **Copy** functionality stores a copy of the selected item in memory so that you can **Paste** it in a new subgraph easily.

The **Paste** functionality places a copy of w hat the Cut or Copy function placed into memory and places it on a new subgraph on the chart. If you paste a copy of an indicator, prediction, or trading strategy, you w ill be able to modify either copy w ithout the other copy being changing.

1. Select a data series on the chart by clicking on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Select the desired function (**Cut** or **Copy**).
3. Select the **Paste** function.

or
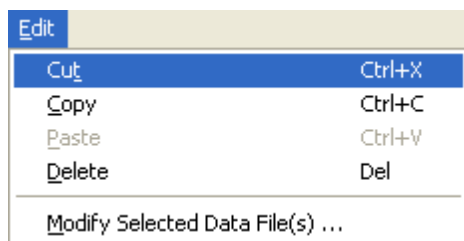
or

1. Select a datas series on the chart by <u>right-clicking</u> the mouse button on the corresponding **line** or **legend text**.
2. Select the desired function (**Cut** or **Copy**) from the pop-up menu.
3. <u>Right-Click</u> the mouse button on an empty section of the graph and select the **Paste** function from the pop-up menu

The Cut/Copy/Paste functionality is limited to a single chart. This means that if you copy an indicator from one chart you may <u>not</u> paste it into a different chart, but you may paste it in the same chart that you copied it from.

Troubleshooting:

- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection w ill not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting tw o data points.

Changing Subgraph Size

To expand or collapse the vertical size of chart subgraphs:

1. Select the subgraph divider to size by **clicking** and **holding** the mouse button w hile the cursor is over the upper line betw een tw o subgraphs.

2. With the mouse button depressed, '**drag**' the cursor to the desired new line location and release the mouse button.

Troubleshooting:

*   You must make sure the mouse cursor has changed to an **up/dow n arrow** before clicking on the upper divider **line**. If the cursor is still an arrow or a cross hair, the selection w ill not occur.

Full Screen Chart

To view the entire screen as the current chart selected you can use the full screen chart method.

1. Select the chart you want to view.
2. Select **Full Screen** from the **View** menu to expand the current chart to the full size of the screen.
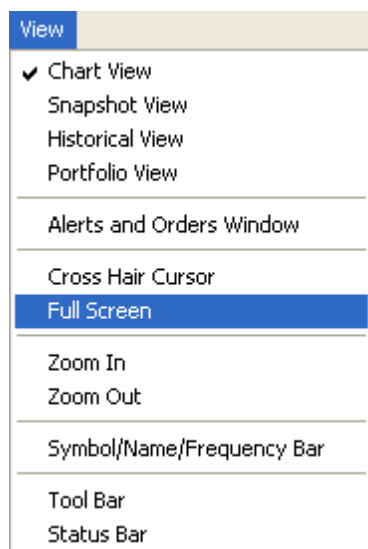
Note:

- When viewing a graph in Full Screen during market hours, the full screen chart view is not updated in real-time. You will see no changes to the chart as new data is collected.

Recalculating Chart Data

Advanced NeuroShell Trader users can use the **Recalculate Chart** pop-up menu item to reread data files and recalculate all the calculations in a chart.

1. Select the chart you wish to recalculate by **right-clicking** the mouse button on the chart.
2. Select **Recalculate Chart** from the pop-up menu.

The **Recalculate Chart** pop-up menu item can be used when the chart is based on an external data file that is being updated by an external program. Manually recalculating the chart will allow new data from the data file to be incorporated into the chart without having to load and unload the chart.

The **Recalculate Chart** pop-up menu item is especially useful when developing external DLL calls and the DLL has not been updated since the chart was loaded (Note that 'UNLOADCUSTOMDLLS=' needs to be set to 'True' in the Nstparam.ini file in order to copy over a dll being used by a chart)

The **Recalculate Chart** pop-up menu item can also be useed to refire a trading strategy or prediction that has inputs of the form Lead(XXX,1) where XXX is raw data like the Open, High, Low , Close or Volume. Use of Lead(XXX,1) allows for a trading strategy or prediction to 'peek' into the next bar to make decisions. This works well when backtesting, but not when used in real time since the trading strategies and predictions are fired at the end of each bar when no data exists in upcoming bars. Use of the '**Recalculate Chart** pop-up menu item essentially tells NeuroShell Trader when to 'peek' into the data of the red bar at the end of the chart in order to revaluate any Lead(XXX,1)'s.

Hiding/Unhiding Data

Hiding/Unhiding data can be very useful in managing a chart because the chart is limited to six subgraphs. You may w ant to hide/unhide data to view different items at different times.

Follow ing the procedure below activates the hide data dialog from w hich you can select the data series on the active chart that you w ish to hide or unhide.

1.   Select the chart you w ish to hide/unhide data by **clicking** the mouse button on the chart.
2.   Select **Hide/Unhide Data** from the **Format** menu.

or
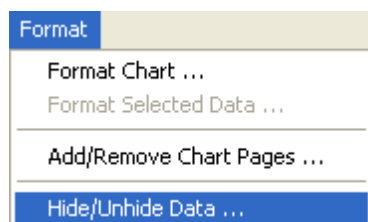
1.   Select the chart you w ish to hide/unhide data by **right-clicking** the mouse button on the chart.
2.   Select **Hide/Unhide Data** from the pop-up menu.
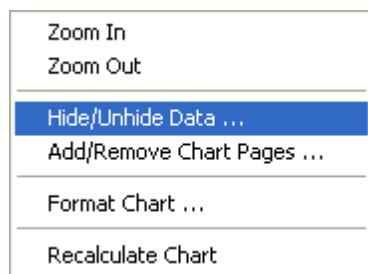
Hide/Unhide Data Dialog

1. Check the subgraphs or data you w ish to display.
2. Uncheck the subgraphs or data you w ish to hide.
3. Press the **OK** button.

Trend Line

A trend line is a type of chart annotation that is usually drawn between two price resistance points or two price support points. Once drawn, the trend line will be drawn between the two points and also extend indefinitely to the right. When future prices approach the trend line extension, it indicates a place of possible resistance or support for prices.

To draw a trend line on a chart:

1. Select **Trend Line** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on the **left most point** of the desired trend line, **drag** the mouse with the button still depressed to the **right most point** of the trend line, and **release** the mouse button.

To move an existing trend line:

1. Select a trend line on the chart by **clicking** on a portion of the trend line.
2. Once the trend line is selected (highlighted with small squares):
   - **Clic**k and **drag**, with the mouse button still depressed, a portion of the trend line that does not have a selection box to move the entire trend line.
   - **Click** and **drag**, with the mouse button still depressed, a selection square on the trend line to reposition only that point of the trend line.

To delete an existing trend line:

3. Select a trend line on the chart by **clicking** on a portion of the trend line.
3. Once the trend line is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:

- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:

- To continue drawing Trend line annotations on the chart without having to reselect the **Trend Line** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing trend lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Trend Channel

A trend channel is a type of chart annotation that is usually drawn between two price resistance points and a price support point or two price support points and a resistance point. Once drawn, a trend line will be drawn between the two resistance/support points and a trend channel line will be drawn with the same slope from the single support/resistance point. Both the trend line and trend channel lines will extend indefinitely to the right. When future prices approach the trend line or trend channel extensions, it indicates a place of possible resistance or support for prices.

To draw a trend channel on a chart:
1. Select **Trend Channel** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on the **left most point** of the desired trend line, **drag** the mouse with the button still depressed to the **right most point** of the trend line, and **release** the mouse button.
3. **Click** the mouse on the point through which the trend channel will be drawn using the same slope as the trend line drawn in 2 above.

To move an existing trend line:
1. Select a trend channel on the chart by **clicking** on a portion of the trend channel.
2. Once the trend channel is selected (highlighted with small squares):
   - **Click** and **drag**, with the mouse button still depressed, a portion of the trend channel that does not have a selection box to move the entire trend channel.
   - **Click** and **drag**, with the mouse button still depressed, a selection square on the trend channel to reposition only that point of the trend channel.

To delete an existing trend channel:
1. Select a trend channel on the chart by **clicking** on a portion of the trend channel.
2. Once the trend channel is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing Trend channel annotations on the chart without having to reselect the **Trend Channel** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing trend channels, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Fibonacci Retracement Lines

A Fibonacci retracement line is a type of chart annotation that is usually drawn between a price peak and subsequent price valley or price valley and subsequent price peak. Once drawn, a line will be drawn between the peak and valley and horizontal lines at increasing Fibonacci retracement percentages will be drawn back towards the first peak or valley. When future prices approach a Fibonacci retracement percentage, it indicates a place of possible price direction reversal.

To draw a Fibonacci retracement on a chart:
1. Select **Fibonacci Retracement Lines** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on the left most peak or valley, **drag** the mouse with the button still depressed to the right most valley or peak, and **release** the mouse button.

To move an existing Fibonacci retracement:
1. Select a Fibonacci retracement on the chart by **clicking** on a portion of the Fibonacci retracement.
2. Once the Fibonacci retracement is selected (highlighted with small squares):
   - **Click** and **drag**, with the mouse button still depressed, a portion of the Fibonacci retracement that does not have a selection box to move the entire Fibonacci retracement.
   - **Click** and **drag**, with the mouse button still depressed, a selection square on the Fibonacci retracement to reposition only that point of the Fibonacci retracement.

To delete an existing Fibonacci retracement:
1. Select a Fibonacci retracement on the chart by **clicking** on a portion of the Fibonacci retracement.
2. Once the Fibonacci retracement is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing Fibonacci retracement line annotations on the chart without having to reselect the **Fibonacci Retracement Lines** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing Fibonacci retracement lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Fibonacci Projection Lines

A Fibonacci projection line is a type of chart annotation that is usually drawn between a price peak, subsequent price valley and subsequent price peak or price valley, subsequent price peak and subsequent price valley. Once drawn, a line will be drawn between the peaks and valleys and horizontal lines at increasing Fibonacci projection percentages will be drawn back towards the 2nd peak/valley. When future prices approach a Fibonacci projection percentage, it indicates a place of possible price direction reversal.

To draw a Fibonacci projection on a chart:
1. Select **Fibonacci Projection Lines** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on the left most peak or valley, **drag** the mouse with the button still depressed to the middle valley or peak, and **release** the mouse button.
3. **Click** the mouse on the right most peak or valley to complete the Fibonacci projection.

To move an existing Fibonacci projection:
1. Select a Fibonacci projection on the chart by **clicking** on a portion of the Fibonacci projection.
2. Once the Fibonacci projection is selected (highlighted with small squares):
   - **Click** and **drag**, with the mouse button still depressed, a portion of the Fibonacci projection that does not have a selection box to move the entire Fibonacci projection.
   - **Click** and **drag**, with the mouse button still depressed, a selection square on the Fibonacci projection to reposition only that point of the Fibonacci projection.

To delete an existing Fibonacci projection:
1. Select a Fibonacci projection on the chart by **clicking** on a portion of the Fibonacci projection.
2. Once the Fibonacci projection is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing Fibonacci projection line annotations on the chart without having to reselect the **Fibonacci Projection Lines** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing Fibonacci projection lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Fibonacci Time Lines

A Fibonacci time line is a type of chart annotation that is usually drawn between price peaks and price valleys. Once drawn, a vertical line will be drawn at the peak and valley and vertical lines at increasing Fibonacci time percentages will be drawn into the future. When future prices approach a Fibonacci time percentage, it indicates a place for a possible price peak or valley.

To draw a Fibonacci time line on a chart:
1. Select **Fibonacci Time Lines** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on the left most peak or valley, **drag** the mouse with the button still depressed to the right most valley or peak, and **release** the mouse button.

To move an existing Fibonacci time line:
1. Select a Fibonacci time line on the chart by **clicking** on a portion of the Fibonacci time line.
2. Once the Fibonacci time line is selected (highlighted with small squares):
    - **Clic**k and **drag**, with the mouse button still depressed, a portion of the Fibonacci time line that does not have a selection box to move the entire Fibonacci time line.
    - **Click** and **drag**, with the mouse button still depressed, a selection square on the Fibonacci time line to reposition only that point of the Fibonacci time line.

To delete an existing Fibonacci time line:
1. Select a Fibonacci time line on the chart by **clicking** on a portion of the Fibonacci time line.
2. Once the Fibonacci time line is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing Fibonacci time line annotations on the chart without having to reselect the **Fibonacci Time Lines** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing Fibonacci time lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Line

A line annotation is simply a line drawn between two points on a chart.

To draw a line on a chart:
1. Select **Line** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on the left most point, **drag** the mouse with the button still depressed to the right most point, and **release** the mouse button.

To move an existing line:
1. Select a line on the chart by **clicking** on a portion of the line.
2. Once the line is selected (highlighted with small squares):
   - **Clic**k and **drag**, with the mouse button still depressed, a portion of the line that does not have a selection box to move the entire line.
   - **Click** and **drag**, with the mouse button still depressed, a selection square on the line to reposition only that point of the line.

To delete an existing line:
1. Select a line on the chart by **clicking** on a portion of the line.
2. Once the line is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing line annotations on the chart without having to reselect the **Line** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Horizontal Line

A horizontal line annotation is simply a horizontal line drawn across an entire chart.

To draw a horizontal line on a chart:
1. Select **Horizontal Line** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on a point near where the horizontal line should be, **drag** the mouse with the button still depressed to the exact position desired, and **release** the mouse button.

To move an existing horitzontal line:
1. Select a horitzontal line on the chart by **clicking** on a portion of the horitzontal line.
2. Once the horitzontal line is selected (highlighted with small squares), **click** and **drag**, with the mouse button still depressed, a portion of the horitzontal to move the entire line.

To delete an existing horizontal line:
1. Select a horizontal line on the chart by **clicking** on a portion of the line.
2. Once the horizontal line is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
*   When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
*   To continue drawing horizontal line annotations on the chart without having to reselect the **Horizontal Line** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing horizontal lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Vertical Line

A vertical line annotation is simply a vertical line drawn across an entire chart.

To draw a vertical line on a chart:
1. Select **Vertical Line** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on a point near where the vertical line should be, **drag** the mouse with the button still depressed to the exact position desired, and **release** the mouse button.

To move an existing horitzontal line:
1. Select a vertical line on the chart by **clicking** on a portion of the vertical line.
2. Once the vertical line is selected (highlighted with small squares), **click** and **drag**, with the mouse button still depressed, a portion of the vertical to move the entire line.

To delete an existing vertical line:
1. Select a vertical line on the chart by **clicking** on a portion of the line.
2. Once the vertical line is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing vertical line annotations on the chart without having to reselect the **Vertical Line** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing vertical lines, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Rectangle

A rectangle annotation is simply a rectangle drawn between two points on a chart.

To draw a rectangle on a chart:
1. Select **Rectangle** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on one of the desired corners of the rectangle, **drag** the mouse with the button still depressed to the opposite corner, and **release** the mouse button.

To move an existing rectangle:
1. Select a rectangle on the chart by **clicking** on a portion of the rectangle.
2. Once the rectangle is selected (highlighted with small squares):
   - **Click** and **drag**, with the mouse button still depressed, a portion of the rectangle that does not have a selection box to move the entire rectangle.
   - **Click** and **drag**, with the mouse button still depressed, a selection square on the rectangle to reposition only that point of the rectangle.

To delete an existing rectangle:
1. Select a rectangle on the chart by **clicking** on a portion of the rectangle.
2. Once the rectangle is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
- To continue drawing rectangle annotations on the chart without having to reselect the **Rectangle** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing rectangles, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Ellipse

An ellipse annotation is simply an ellipse draw n betw een tw o points on a chart.

To draw an ellipse on a chart:
1. Select **Ellipse** from the **Drawing** menu.
2. **Click** and **hold** the mouse button on one of the desired corners of the ellipse, **drag** the mouse w ith the button still depressed to the opposite corner, and **release** the mouse button.

To move an existing ellipse:
1. Select an ellipse on the chart by **clicking** on the upper, low er, right, or left most portion of the ellipse.
2. Once the ellipse is selected (highlighted w ith small squares):
   - **Clic**k and **drag**, w ith the mouse button still depressed, a portion of the ellipse that does not have a selection box to move the entire ellipse.
   - **Click** and **drag**, w ith the mouse button still depressed, a selection square on the ellipse to reposition only that point of the ellipse.

To delete an existing ellipse:
1. Select an ellipse on the chart by **clicking** on the upper, low er, right, or left most portion of the ellipse.
2. Once the ellipse is selected (highlighted w ith small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
- When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection w ill not occur.

Note:
- To continue draw ing ellipses on the chart w ithout having to reselect the **Ellipse** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done draw ing ellipses, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Text

Text annotation is simply user specified text drawn on a chart.

To draw text on a chart:
1. Select **Text** from the **Drawing** menu.
2. **Click** on the chart at the desired location of the text.

To change existing text to a different text string:
1. **Double click** text on the chart.
2. **Enter** the new text to replace the old text on the chart and press **OK**.

To move existing text:
1. Select text on the chart by **clicking** on a portion of the text.
2. Once the text is selected (highlighted with small squares), **click** and **drag**, with the mouse button still depressed, a portion of the textl to reposition the text.

To delete existing text:
1. Select text on the chart by **clicking** on a portion of the text.
2. Once the text is selected (highlighted with small squares), press the **Delete** key or select **Delete** from the **Edit** menu.

Troubleshooting:
*   When moving or deleting an annotation, you must make sure the mouse cursor has changed to a **hand** before clicking on the annotation. If the cursor is still an arrow or a cross hair, the selection will not occur.

Note:
*   To continue drawing text annotations on the chart without having to reselect the **Text** menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing text, simply select another type of annotation or unselect **Remain in Drawing Mode**.

Remain in Drawing Mode

To continue drawing annotations on the chart without having to reselect the annotation's menu item each time, select **Remain in Drawing Mode** from the **Drawing** menu. Once you are done drawing the annotation, simply select another type of annotation menuitem or unselect **Remain in Drawing Mode**.

Adding Existing Data/Calculations to a Chart

Adding existing data/calculations to a chart may be useful to view data that may be used as an input to an indicator or prediction that isn't currently show n on the chart.

1. Select **Existing Data/Calculations** from the **Insert** menu. This activates the data dialog box, w hich allow s you to select data series you w ish to add to the active chart.
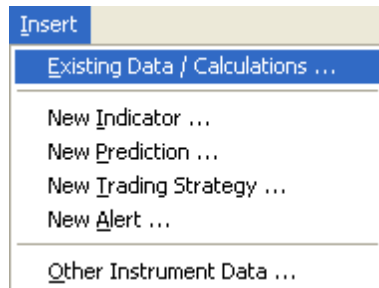
Insert Existing Data/Calculations Dialog

1. Select the item or items you wish to add from the list.
2. To select indicator, prediction, and trading strategy inputs and outputs, click the mouse over the small + and – symbols to the left of the root indicator, trading strategy, or prediction.
3. Press the **OK** button.

Tip:

- Various data streams may be available based upon how you've customized your environment.

Adding Data from Another Instrument

Adding data from another instrument allow s you to view other data that may be relevant to the instruments on your chart (i.e. Dow Jones Industrial Average applies to many stocks).

1. Select **Other Instrument Data** from the **Insert** menu. This activates the instrument data w izard, w hich guides you through the process of adding data from another instrument.

Instrument Wizard - Selecting a Category

Selecting the instrument category w ill select w hat type of data you w ant to view .

1. Select the category of instrument or instruments you w ish to add.
2. Press the **Next** button to proceed to the next w izard screen.

Troubleshooting:

- If you think the categories listed are incorrect or some categories are missing, you w ill need to change your data sources settings. To do this, press the **Cancel** button, select **Data Sources** from the **Tools** menu. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.

Instrument Wizard - Selecting an Instrument

Selecting the instrument that you want to view allows you to select one or more instruments that you want to view on your chart.

1. Select the instrument or instruments you wish to add.
2. Press the **Next** button to proceed to the next wizard screen.

To sort by ticker symbol:
2. Select the **Sort by Symbol** option.

To sort by name/description:
1. Select the **Sort by Name** option.

To show only the items selected in your list:
1. Select the **Selected items only** option.

To show all the items in the list (both selected and not selected):
1. Deselect the **Selected items only** option.

If you are using Quote.com, eSignal or Prophet.net as your data source, you have the option of adding instruments that are not already listed. To add a new ticker symbol:
1. Press the **Add New Quote.com Ticker Symbol**, the **Add New eSignal Ticker Symbol** or the **Add New Prophet.net Ticker Symbol** button.
2. Enter the instrument's ticker symbol into the **Ticker** box
3. Enter the instrument's full name into the **Name** box
4. Select the instrument's category using the **Category** drop down box.
5. Press the **OK** button to add the new instrument.

Tip:
- To select a group of instruments, hold the **left mouse button** down while **dragging** the mouse over the desired instruments.

Troubleshooting:
- If the instruments listed are not what you expect for the category you chose on the previous wizard screen or instruments are missing that you think should be present for the previously selected category, then you will need to change your data sources settings. To do this, press the **Cancel** button and select **Data Sources** from the **Tools** menu.

Notes:
- If you are using the data that came on the NeuroShell Trader Historical Data CD or the data installed in the NeuroShell Trader Data subdirectory, you may see extra letters after the stock name (For example: Microsoft MSQ ZMF ZJZ). This is an indication that the stock is an optionable stock and the letters are the actual root symbols for the stock's option contracts.
- If you are unable to find a ticker, you'll want to make sure that your data is setup correctly. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.
- NeuroShell Trader will handle all data conversion if you add an instrument whose data file periodicity is different from the data files upon which the chart is based.

  Example #1: If you add a daily instrument to a monthly chart, NeuroShell Trader will set the instrument's monthly open equal to the first daily open, the monthly high equal to the highest daily high, the monthly low equal to the lowest daily low, and the monthly close equal to the last daily close. Additionally, the monthly volume & open interest equal to the sum of all daily volumes & open interests, and all other monthly data values equal to the last daily data value.

  Example #2: If you add a monthly instrument to a daily chart, the instruments data will be extended so that each day displays the last monthly value.

Instrument Wizard - Selecting Data

Selecting data allows you to choose which types of data you want to view for the instruments that you selected on the previous wizard page.

1. Select the data item or items you wish to add.
2. Press the **Finish** button to end the wizard and add the instrument data items.

Viewing a Different Chart Page

Viewing a different chart page can be very useful if you are applying your data to multiple instruments and want to see the results of your analysis on the other instrument(s).

You may view a different chart page by:
- Selecting a new ticker symbol from the first drop down list at the top of the chart
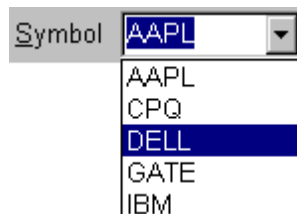
- Selecting a new instrument name from the second drop down list at the top of the chart

- Selecting the instrument in the Portfolio View (if the Portfolio View is being viewed).

Tips:
- To view a new chart page you may type the ticker symbol in the first drop down list at the top of the chart.
- To view a new chart page you may type the instrument name in the second drop down list at the top of the chart.

Adding/Removing Chart Pages

Adding/Removing chart pages can be very useful if you want to apply the analysis that you have done on the current chart to different instruments in the same instrument category.

Following the procedures below activates the chart wizard, allowing you to select and deselect instruments.

1. Select the chart you wish to Add/Remove Chart Pages by **clicking** the mouse button on the chart.
2. Select **Add/Remove Chart Pages** from the **Format** menu.

or
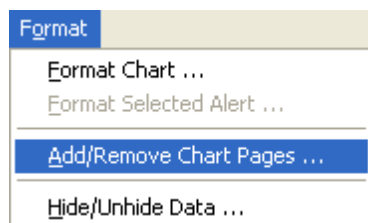
1. Select the chart you wish to Add/Remove Chart Pages by **right-clicking** the mouse button on the chart.
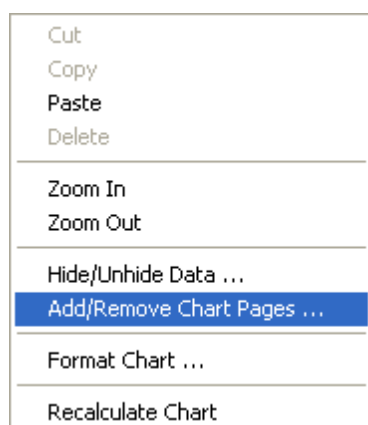2. Select **Add/Remove Chart Pages** from the pop-up menu.

Chart Wizard - Selecting Instruments

Selecting the instruments that you want to view allows you to choose which instruments you want to view on your chart. You can always Add/Remove Chart Pages at a later time.

1. Select the instrument or instruments you wish to chart.
2. Press the **Finish** button to end the wizard and display the chart.

To sort by ticker symbol:
1. Select the **Sort by Symbol** option.

To sort by name/description:
1. Select the **Sort by Name** option.

To show only the items selected in your list:
1. Select the **Selected items only** option.

To show all the items in the list (both selected and not selected):
1. Deselect the **Selected items only** option.

If you are using Quote.com, eSignal or Prophet.net as your data source, you have the option of adding instruments that are not already listed. To add a new ticker symbol:
1. Press the **Add New Quote.com Ticker Symbol**, the **Add New eSignal Ticker Symbol** or the **Add New Prophet.net Ticker Symbol** button.
2. Enter the instrument's ticker symbol into the **Ticker** box
3. Enter the instrument's full name into the **Name** box
4. Select the instrument's category using the **Category** drop down box.
5. Press the **OK** button to add the new instrument.

Notes:
- **If you select multiple instruments, each one will be displayed on its own 'chart page'.** Once the chart is displayed, you will be able to flip between 'chart pages'.
- **Any analysis technique (indicators, predictions, …) you create will automatically be applied to all 'chart pages'.**
- Once a chart is created, you can add/remove instruments by selecting **Add/Remove Chart Pages** under the **Edit** menu. **Analysis techniques already applied to the chart will be replicated on each new 'chart page'.**
- If you are using the data that came on the NeuroShell Trader Historical Data CD or the data installed in the NeuroShell Trader Data subdirectory, you may see extra letters after the stock name (For example: Microsoft MSQ ZMF ZJZ). This is an indication that the stock is an optionable stock and the letters are the actual root symbols for the stock's option contracts.

Tips:
- To select a group of instruments, hold the **left mouse button** down while you **drag** the mouse over the desired instruments.
- If you are unable to find a ticker, you'll want to make sure that your data is setup correctly. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.
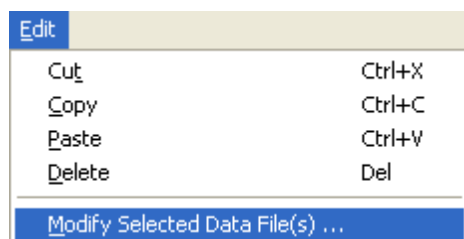
Troubleshooting:
- If the instruments listed are not what you expect for the category you chose on the previous wizard screen or instruments are missing that you think should be present for the previously selected category, then you will need to change your data sources settings. To do this, press the **Cancel** button and select **Data Sources** from the **Tools** menu.

Modifying Data Files

Modifying data may be desirable, if you find that a specific value is incorrect.

1. Select a data series on the chart by **clicking** on the corresponding **line**, **legend text**, or **Snapshot View text**..
2. Select **Modify Selected Data File(s)** from the **Edit** menu.

or

1. Select a data series on the chart by **right-clicking** on the corresponding **line** or **legend text**.
2. Select **Modify Selected Data File(s)** from the pop-up menu.
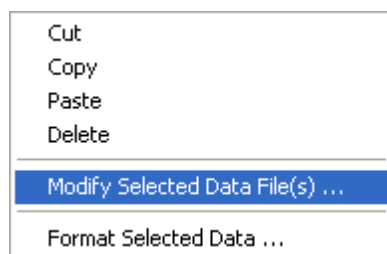
Troubleshooting:

- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection will not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting two data points.

Modify Data Dialog

The Modify Data dialog allows you to correct data that is incorrect for any file that NeuroShell Trader is able to read. The folder tab describes what kind of file the folder tab is representing, below that is the path and filename for the file on the selected folder tab, and below that is the data that the selected file has in it.

In order to modify a specific data value:
1.   Select the folder tab that represents the file that you want to modify.
2.   Move the cell in the grid to date and column that you want to modify.
3.   Type the corrected value in that cell.
4.   Select the **OK** button to save your corrections.

In order to restore a specific data value to its original value:
1.   Select the folder tab that represents the file that you want to restore.
2.   Move the cell in the grid to date and column that you want to restore. (It will be marked in yellow or red with the original value placed in the **Original Value** box).
3.   Select the **Restore** button.
4.   Select the **OK** button to save your corrections.

NeuroShell Trader doesn't modify the selected data file, but rather saves the corrections that you have made and replaces the data you have corrected any time that the corrected file is loaded in the future. This means that if you attempt to use any other program that the corrected data file will not have the corrected values in it.

Additionally, the Modify Data Dialog uses several colors to inform you of important information that is associated with the colored grid cell. The following describes the color scheme for the cell backgrounds:
- **Red** - you have just modified this cell and changes will be saved when you select the OK button. (Restore value is shown in the **Original Value** box when cell selected).
- **Yellow** - you have previously modified this cell. (Restore value is shown in the **Original Value** box when cell selected).
- **Gray** - NeuroShell Trader uses this data for possible split information only. The method that NeuroShell Trader uses to combine files has chosen another file to get the data from. Any changes made to a gray cell will be saved, but it will not be reflected on the current chart, unless it changes the split information that NeuroShell Trader needs to combine files.

Finally, NeuroShell Trader uses newer file information to decide whether a split has occurred in the older file. If any overlapping data doesn't match, NeuroShell Trader applies a split to an older file (this is so that CD-ROM data is still usable). If a file has a split applied to it you will see a note at the bottom of the selected folder tab that explains that there has been a split.

Combination Ticker Symbols

Neuroshell Trader allow s the use of combination ticker symbols w hich are simple combinations of other ticker symbol prices. When used in a chart, the combination ticker symbol is the primary data series, predictions and trading strategy are based on the ticker symbol combination and all trading statistics are calculated on the combination ticker symbol.

An example of a combination ticker symbol combination might be [5*YHOO-2.5*INTC+3*MSFT], w hich w ould result in a price stream on the chart that is 5*YHOO's price minus 2.5*INTC's price plus 3*MSFT's price. Examples of valid combination ticker symbols are as follow s:

        [YHOO - INTC]
        [5 * YHOO - 2.5 * INTC]
        [5 * YHOO - 2.5 * INTC + 3 * MSFT]
        [5 * YHOO - 2.5 * INTC + 3 * MSFT - 4 * DELL]
        [YHOO / INTC]
        [2 * YHOO / 3 * INTC]

Quotes may be used around ticker symbols to allow for ticker symbols that contain arithmetic operators like *, -, +, and /. An example of a combination ticker combination ticker symbol w hich uses quotes is as follow s:

        ["bl u5-dt"-"gb u5-dt"]

It should be noted that combination ticker symbols are a useful method of creating hedging trading strategies. When using a ticker symbol like [5*YHOO – 3*INTC], long positions w ould be equivalent to being long 5 shares of YHOO and short 3 shares of INTC. Conversely, short positions w ould be equivalent to being short 5 shares of YHOO and long 3 shares of INTC.

To create a combination ticker, simply create a new ticker symbol like [5*YHOO-2.5*INTC+3*MSFT]. To add a new ticker symbol, use the add ticker button found in the chart w izard w hen using Quote.com or eSignal.

Important Note:

Combination ticker symbols not in the formats listed above w ill not be recognized by NeuroShell Trader. Only combination tickers of a quadratic form like [aX + bY + cZ + …] or the form [aX / bY] w ill be recognized. Combination tickers like [1+2+3+IBM] or [IBM/2 + DELL/2] or [2*4*IBM / 4 + 3*DELL + (IBM + 3)/DELL] or any other complicated arithmetic forms are not recognized.

What are Indicators?

An Indicator is a mathematical formula that is useful in detecting, recognizing, and/or predicting market trends. Indicators may be plotted on your chart or just calculated for use as an input to another indicator, prediction, or trading strategy.

One common example of an indicator is a simple moving average. The five day simple moving average of the close (Annotated: Avg(Close, 5)) calculates the average of the last five days closing price. When trying to evaluate trends of an instrument, indicators like the simple moving average might be valuable because they incorporate more than one day's prices.

For more information on any particular indicator: Select the **Indicator Help** button.

Topic of Interest:
What are Custom Indicators? (Professional Only)

Creating an Indicator

Creating an indicator w ill allow you to add indicators to your chart that are used in technical analysis of instruments on your chart.

1. Select **New Indicator** from the **Insert** menu. This activates the indicator w izard, w hich guides you through the process of creating an indicator.
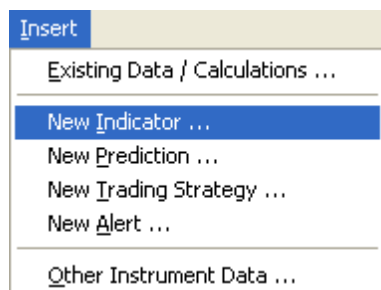
Note:

- You may have multiple indicators displayed on one chart by simply creating more than one indicator.

Topics of Interest:

What are Indicators?

What are Custom Indicators? (Professional Only)

Indicator Wizard - Selecting a Category

Selecting a category will allow you select the specific indicator that you want to use. This is necessary to select the indicator you want to add. If you are unsure what category you want to add an indicator from you may select the all indicators category.

1. Select a category by clicking on the desired category (i.e. Basic, Simple Moving Average, …).
2. Press the **Next** button or **double-click** on the category to proceed to the next wizard screen.

All the available indicator categories and the category arranging buttons described below may not be visible depending upon the currently selected Indicator Wizard Interface Options. Press the **Options** button if to change the Indicator Wizard Interface Options. For more information see Indicator Wizard Interface Options.

To rearrange the order in which the categories are shown in the list, use the category arranging buttons at the bottom of the list:

> **Move Up** - moves the currently selected category up in the list.
> **Move Down** – moves the currently selected category down in the list.
> **Reset** – Resets all the categories to their original default positions.

Note:

● Not all indicators will be available if NeuroShell Trader has detected that a Boolean condition is required. This is true for Trading Strategy Entry and Exit conditions, as well as inputs to indicators (i.e. If X then Y else Z – X must be a Boolean condition).

Topics of Interest:

What are Indicators?

What are Custom Indicators? (Professional Only)

Indicator Wizard - Selecting an Indicator

Select an indicator or indicators that you w ant to add to your chart.

1. Select an indicator or indicators from the list by clicking on the desired indicator(s).
2. Press the **Next** button or **double-click** on the indicator to proceed to the next w izard screen.

Tip:

- To select a group of indicators, hold the **left mouse button** dow n w hile you **drag** the mouse over the desired indicators.

Notes:

- Press the **Indicator Help** button for information about the currently selected indicator.
- To delete a custom indicator select the indicator to be deleted and select the delete button on your keyboard (this w ill delete the custom indicator off your system permanently).

Topics of Interest:

What are Indicators?

What are Custom Indicators? (Professional Only)

Indicator Wizard - Choosing Parameters

Choosing parameters allow s you set your indicator parameters as desired (i.e. to set the number of periods a moving average is calculated over)

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters.
If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters.

To set or replace the currently selected parameter:
1.   Select the **Set Parameter** button.
2.   Press the **Finish** button to end the w izard and add the indicator.

To modify an indicator, data stream, or numeric parameter:
1.   Select the indicator, data stream, or numeric parameter to be modified.
2.   Select the **Modify Parameter** button.
3.   Press the **Finish** button to end the w izard and add the indicator.

For information about an indicator:
1.   Select the indicator for w hich you w ant more information
2.   Press the **Indicator Help** button

The Save Indicator and Modify buttons described below may not be visible depending upon the currently selected Indicator Wizard Interface Options. Press the **Options** button to change the Indicator Wizard Interface Options. For more information see Indicator Wizard Interface Options.

(Professional Only) To save an indicator as a custom indicator:
1.   Select the indicator to be modified
2.   Press the **Save Indicator** button (or the **Modify Indicator** button if you have previously saved the custom indicator).

(DayTrader Only) To eliminate large indicator fluctuations due to the gap betw een a days opening price and the previous days closing price, select **Don't calculate indicator(s) across day boundaries**. When this option is selected, none of the previous days values are used w hen calculating the indicator(s). As a result, an indicator like MovAvg(Volume,5) w ill not produce a value until the 5th bar of the day w hen this option is selected.

Notes:
- If you specify multiple parameters, more than one indicator w ill be created. To specify multiple parameters, separate each value by a comma (or semi-colon if the w indow s regional settings are set such that a semi-colon is the standard w indow s list separator). For example, specifying a moving average size of '5, 10, 20' w ill create three moving averages.
- To specify a range of parameters separate the start of the range from the end of the range w ith a colon. For example, specifying a moving average size of '5:10' w ill create moving averages w ith sizes of 5,6,7,8,9, and 10. You may also place an increment value after the end value, again separated by a colon. For example, specifying a moving average size of '10:20:2' w ill create moving averages w ith sizes of 10, 12, 14, 16, 18, and 20.
- (DayTrader Only) Be careful w hen using the **Don't calculate indicator(s) across day boundaries** option for indicators having a large lookback w indow relative to the number of bars per day. For example, if this option is applied to the indicator MovAvg(Volume,40) on an hourly chart, no values w ill be produced as the lookback is larger than the number of bars on any given day. When used in predictions and trading strategies, this problem may cause the prediction or trading strategy to trade only a few bars per day or possibly not trade at all.

Topics of Interest:
What are Indicators?
What are Custom Indicators? (Professional Only)

Parameter Dialog - Numeric

1. Enter a numeric value for the parameter whose name is shown in the title bar.
2. Press the **OK** button.

Notes:

- To determine the range of values that are valid for this parameter refer to the **Indicator Help**.
- To list multiple values separate each value by a comma (i.e. 5,10,15,20). Note that if the windows regional settings are set such that a semi-colon is the standard Windows list separator, then separate each value by a semi-colon (i.e. 5; 10; 15; 20).
- To list a range of values separate the start of the range from the end of the range with a colon (i.e. 5:10 = 5,6,7,8,9,10). You may also place an increment value after the end value, again separated by a colon (i.e. 5:25:10 = 5,15,25).
- (Professional Only) When selecting numeric values for indicators when performing Full Optimization or Parameter Search optimization from the Prediction Wizard or Trading Strategy Wizard you need to enter a range of values to perform the optimization over (the larger the range the longer the optimization process will take).

Parameter Dialog - Numeric

1. Enter a numeric value for the parameter whose name is shown in the title bar.
2. Press the **OK** button.

Notes:

-   To determine the range of values that are valid for this parameter refer to the **Indicator Help**.
-   To list multiple values separate each value by a comma (i.e. 5,10,15,20). Note that if the windows regional settings are set such that a semi-colon is the standard Windows list separator, then separate each value by a semi-colon (i.e. 5; 10; 15; 20).
-   To list a range of values separate the start of the range from the end of the range with a colon (i.e. 5:10 = 5,6,7,8,9,10). You may also place an increment value after the end value, again separated by a colon (i.e. 5:25:10 = 5,15,25).
-   (Professional Only) When selecting numeric values for indicators when performing Full Optimization or Parameter Search optimization from the Prediction Wizard or Trading Strategy Wizard you need to enter a range of values to perform the optimization over (the larger the range the longer the optimization process will take).

Parameter Dialog - Numeric

1. Enter a numeric value for the parameter whose name is shown in the title bar.
2. Press the **OK** button.

Notes:

- To determine the range of values that are valid for this parameter refer to the **Indicator Help**.
- To list multiple values separate each value by a comma (i.e. 5,10,15,20). Note that if the windows regional settings are set such that a semi-colon is the standard Windows list separator, then separate each value by a semi-colon (i.e. 5; 10; 15; 20).
- To list a range of values separate the start of the range from the end of the range with a colon (i.e. 5:10 = 5,6,7,8,9,10). You may also place an increment value after the end value, again separated by a colon (i.e. 5:25:10 = 5,15,25).
- (Professional Only) When selecting numeric values for indicators when performing Full Optimization or Parameter Search optimization from the Prediction Wizard or Trading Strategy Wizard you need to enter a range of values to perform the optimization over (the larger the range the longer the optimization process will take).

Indicator Wizard - External DLL (Professional Only)

In order to make a call to an external DLL, follow the procedure below :

1. Select the **Filename** of the DLL by selecting the "…" button and selecting the DLL that you want to call.
2. Select the **Procedure Name** that you want to call from the drop down list.
3. Select the **Indicator output is a Boolean value** if the output of the indicator represents a zero or non-zero (off/on) output (this is so it can be used as a Trading Strategy Condition if desired).
4. Select the **Procedure Type** of the selected procedure (return value of the procedure).
5. If the return value is not "Sub (void)" you can select **Use the function return value as the indicator output** (this means that the value(s) that the function returns will be used as the output of the indicator).
6. Select the **Number of Parameters** that NeuroShell Trader should pass to the procedure.
7. If the **Number of Parameters** is not zero you will need to define the **Use**, **Declaration Type**, and **Value Type** of each parameter. To modify a parameter:
    *   Select the parameter to be modified
    *   Select the **Modify Parameter** button
8. Press the **Next** button to proceed to the next wizard screen.

Note:
*   Refer to Indicator Help to distinguish between External DLL Call by Array versus External DLL Call by Value.

Topics of Interest:
What are Indicators?
What are Custom Indicators? (Professional Only)

Indicator Wizard - NeuroShell 2 (Professional Only)

In order to make a call to a NeuroShell 2 neural network follow the procedure below :

1. Select the **Filename** of the NeuroShell 2 DEF file by selecting the "…" button and selecting the NeuroShell 2 DEF file that you want to call.
2. Select the NeuroShell 2 Output that you want to use (NeuroShell Trader is capable of using only one output at a time).
3. Press the **Next** button to proceed to the next wizard screen.

Topics of Interest:

What are Indicators?

What are Custom Indicators? (Professional Only)

Indicator Wizard - NeuroShell Predictor/Classifier (Professional Only)

In order to make a call to a NeuroShell 2 neural network follow the procedure below :

1. Select the **Filename** of the NeuroShell Predictor/Classifier net file by selecting the "…" button and selecting the NeuroShell Predictor/Classifier net file that you want to call.
2. Select which NeuroShell Predictor/Classifier Output you want to use (NeuroShell Trader is capable of using only one output at a time).
3. Press the **Next** button to proceed to the next wizard screen.

Topics of Interest:

What are Indicators?

What are Custom Indicators? (Professional Only)

Modify DLL Parameter (Professional Only)

The Modify DLL Parameter dialog allows you to define the properties of the DLL parameter so that NeuroShell Trader will know how to send/receive data from your DLL procedure properly. For more information download the Software Development Kit (SDK) from the tech support and advanced user web site: http://www.ward.net/

To define the DLL parameter:

1. Select the Declaration Type for the parameter (if the DLL Call is expecting a variable of size integer you need to tell NeuroShell Trader how to pass the data).

2. Select "**How should NeuroShell Trader utilize the parameter?**" This tells NeuroShell Trader if it should pass data to the DLL parameter (**As an Indicator Input**), use data returned from the DLL parameter as the output (**As the Indicator Output**), if it should pass the number of elements in the time series (**As the number of values in Time Series input(s)**), if it should pass the Julian Date (**As the Date**), or if NeuroShell Trader should ignore the parameter (**Ignore the Parameter**).

Notes:

- If you select the DLL parameter to be an Indicator Input you will need to select a name for the parameter as it will show up on the Parameters screen of the Indicator Wizard. Additionally, you will need to select the type of values are acceptable to be passed to the DLL parameter (**Time Series** and/or **Numeric Value**). Finally, if you have selected that it is acceptable to pass a **Numeric Value**, then you will need to define what numeric values are acceptable (i.e., Real Number, Real Number > 0, Integer >= 1, or etc.).

- Once you create a DLL Call you may save it as a custom indicator, so that you don't need to redefine the call every time you want to use the indicator.

- For more information on defining DLL Calls download the Software Development Kit (SDK) from the tech support and advanced user web site: http://www.ward.net/.

- Julian Date is consider to be the number of days since December 31, 1899.

- When using the DLLArray indicator all inputs, outputs, and date parameters must be passed by reference (byref or *). This is so NeuroShell Trader can pass a pointer to the array of input, output, or date. Otherwise only one value can be passed.

Modifying Indicators

Modifying indicators allow s you to modify the currently selected indicator. This may be useful if you w ant to change the parameters of an indicator (i.e. moving average periods), or the type of indicator being used (i.e. MACD to MACD Signal).

1. Select an indicator displayed on the chart by **clicking** on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Once the indicator is selected (highlighted w ith black boxes), select **Modify Selected Indicator** from the **Edit** menu.

or
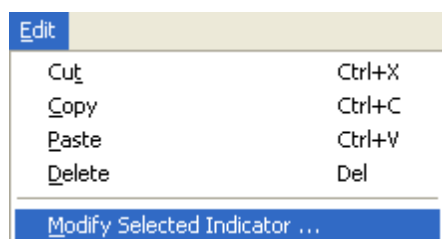
1. Select an indicator displayed on the chart by **right-clicking** on the corresponding **line** or **legend text**.
2. Select **Modify Selected Indicator** from the pop-up menu.
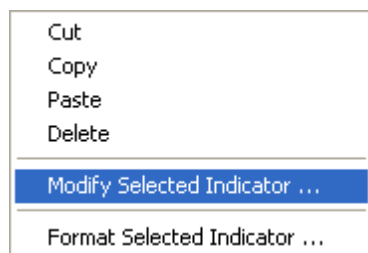
or

1. Modify an indicator displayed on the chart by **double-clicking** on the corresponding **line** or **legend text**.

Troubleshooting:
- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection w ill not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting tw o data points.

Topics of Interest:
What are Indicators?
What are Custom Indicators? (Professional Only)

What are Custom Indicators? (Professional Only)

Custom Indicators are a way of saving indicators in a way that may be easier to use, easier to understand, and/or easier to distribute.

By creating a custom indicator you are able to create a complicated indicator with many levels of indicator nesting (i.e. Avg(%Change(Close,5),10)) can be turned into a single level indicator (i.e. My Indicator(Close, 5, 10)). Also, you have the ability to hide parameters that you feel you won't want to modify (i.e. My Indicator(Close)).

Additionally, by creating a custom indicator you are able to create an indicator that will be more understandable. You can take a multilevel indicator (i.e. Avg(StdDev(Close, 10),10)) that is not that meaningful and give it a more meaningful name (i.e. Smoothed Volatility(Close)).

Finally, by creating a custom indicator (even one that may need to call a DLL) you can create a method to distribute your indicator(s) more easily. This will allow you to create an indicator on one chart and use it in all of your charts, as well as distribute your custom indicator to customers.

To distribute your custom indicator, you must install the custom indicator template from your <C:\NeuroShell Trader>\Template\ directory that has the same name as your custom indicator (i.e. My Indicator.tpl) into your customers <C:\NeuroShell Trader>\Template\ directory. Additionally, you must make sure to install (and register if necessary) all DLLs that are required (if any). If you are distributing a corresponding help file, the help file must be installed into your customers <C:\NeuroShell Trader>\Template\ directory.

If you want to distribute a custom indicator or a set of custom indicators, it is recommend that you inform Ward Systems Group Sales Department of what you are distributing, so that it can maintain a list of Solution Providers for all of it's customers.

Save Template Dialog (Professional Only)

The Save Template Dialog allows you to name the custom indicator, select the category (new or already existing), and modify advanced features of the custom indicator. To save a custom indicator:

1. Enter the **Name** of the custom indicator you wish to save.
2. Enter the **Category** of the custom indicator you wish to save (you may do this by selecting an existing category from the drop down list or typing in a new Category name).
3. (Optional) Select the **Advanced** button to modify the parameter mapping, parameter defaults, indicator help file, and password protect the indicator.
4. Select the **OK** button to save your custom indicator.

To edit an indicator that has been previously saved as it was shown originally:

1. Select the **Reconstruct Original Indicator** button.
   Notes:
   - This will not "unsave" the indicator previously saved.
   - All changes made either in the Indicator Wizard or the Save Template dialogs will be lost.
   - In order to replace an original indicator with minor changes you will want to reconstruct the indicator, save the indicator under a new name, select the original indicator in the indicator list (make sure no others are selected) and press the **delete** key on your keyboard, select the "new" indicator, modify saved indicator (from the parameter selection screen), and save the indicator using the "original" name.

Note:
- After selecting **OK** the indicator will show in the category that you had previously selected, but the next time you enter the Indicator Wizard it will be shown only in the Category that you entered on this screen.

Topic of Interest:
What are Custom Indicators? (Professional Only)

Save Template Advanced Dialog (Professional Only)

The Save Template Advance Dialog allows you to modify the parameter mapping, parameter defaults, indicator help file, and password protection for the indicator.

To password protect your indicator (this means in order to modify it you must provide the password):
1.   Select the **Password** check box
2.   Enter a **Password** in the text box that you will remember.

To map a help file to the custom indicator (so that when you select Indicator Help from the Indicator Wizard it will load the select Help File/Topic ID):
1.   Select the **Help File** check box.
2.   Enter a **Help File** name in the text box (either by typing or by selecting the browse button "…"). Note that all custom indicator help files must be located in the <C:\NeuroShell Trader>\Template\ directory.
3.   Enter the **Topic ID** of the help topic to be loaded.

To modify the parameter name, mapping, and/or default value:
1.   Select the parameter that you want to modify.
2.   Select the **Modify** button.

When you have completed modifying the parameter mapping, parameter defaults, indicator help file, and password protection select the **OK** button.

Topic of Interest:
What are Custom Indicators? (Professional Only)

Modify Parameter's Display Properties (Professional Only)

The Modify Parameter's Display Properties dialog allows you to specify the order in which parameters are to be displayed (if at all), the name of the parameter to be displayed in the Indicator Wizard (and other places), and the default values for the custom indicator (if defaults are desired).

To hide a parameter from a user in the Indicator Wizard, and elsewhere, select the **Hidden from user option** (this will not be an option if the parameter is a Time Series). Note that if you hide a parameter, the parameter will essentially be unchangeable from its current value. You will not be able to set this parameter to a different value or optimize this parameter.

To change the location of the parameter in the Parameter List of the Indicator Wizard and/or map two (or more) parameters to the same parameter:

1.   Select **Display as Parameter Number** option.
2.   Select the desired parameter number.

To change the Parameter Name, enter a new name in the **Parameter Name** field.

To force the parameter value to be defaulted to nothing, deselect the **Default Value** check box. Otherwise, to select the default value:

1.   Select the **Default Value** Check box.
2.   Select the "**…**" button to select the default value.

To set the default optimization parameter range when the indicator is used in an optimization:

1.   Enter a minimum and maximum value for **Optimization Range.**

Once you are satisfied with the parameter's display order, the name of the parameter, and the default values for the custom indicator select the **OK** button.

Topic of Interest:

What are Custom Indicators? (Professional Only)

Program Calls (DLLs)

The NeuroShell Trader Professional includes indicators that can call external DLLs created (usually) in C, C++, Ibasic Pro, Power Basic, or Delphi. (If you don't already have a preference, we recommend Ibasic Pro because it is easy to use and costs only $49.99 at this writing - see www.pyxia.com). This feature is located in the 'DLL calls' category in the Indicator Wizard. This is a very powerful feature, because it means that you can build custom indicators and other functions and use them in the NeuroShell Trader. You can even build a business selling these to NeuroShell Trader users. However, you will need to have a programmer available to help you set up the calls to the DLLs, and the programmer will have to know something about the DLL he/she is trying to call.

There are two types of DLL calls:

1. Calling DLL by value. In this mode, the DLL is called once for each bar. The inputs to the DLL will usually be some current or lagged values, and the output will be associated with that bar on the chart. This mode would be perfect for building a custom indicator in C++.

2. Calling DLL by array. In this mode, the DLL is called only once for the entire chart. Each parameter is an array that is as large as the number of bars loaded in the chart. The output is an array of the same size. This mode is for building some sort of process that needs all the data at once.

Calls to NeuroShell2 and Predictor/Classifier Nets

You can call neural netw orks you created w ith NeuroShell 2, NeuroShell Predictor, or NeuroShell Classifier w ithin the Trader. These net calls are special indicators in the 'DLL calls' category in the Indicator Wizard. You still have to train these nets w ithin the respective programs, but they can be fired in the Trader, looking like an indicator. This indicator can then be used in a trading strategy, another indicator, or even another net. It is easy to train nets in these programs using Trader data if you use the Trader's file export facility.

In order to call Predictor/Classifier netw orks, you must ow n the NeuroShell Run-Time Server. When you call the indicator to fire NeuroShell 2 nets you must not only pass it the inputs to the net in the proper order, but the path to the .DEF file as w ell. For Predictor and Classifier nets, you w ill need the path to the saved netw ork file as w ell as the inputs.

What are Neural Networks?

Neural network technology mimics the brain's own problem solving process. Just as humans apply knowledge gained from past experience to new problems or situations, a neural network takes previously solved examples to build a system of "neurons" that makes new decisions, classifications, and forecasts.

Neural networks look for patterns in training sets of data, learn these patterns, and develop the ability to correctly classify new patterns or to make forecasts and predictions. Neural networks excel at problem diagnosis, decision making, prediction, classification, and other problems where pattern recognition is important and precise computational answers are not required.

Topics of Interest:

What Type of Problems do Neural Networks Solve?

What is Training Data?

Network Structure

How Does a Neural Network Learn?

Advanced Users

Neural Network - Output Discussion

Neural Network - Input Discussion

Neural Network - Network Criteria Discussion

Neural Network - Results Discussion

References

What Type of Problems Do Neural Networks Solve?

Neural networks solve three major classes of problems:

Prediction: The network estimates a number from a set of input values using pattern recognition that the network learned from the training set of data. Examples of prediction problems include forecasting the next day's closing price of a stock, interest rate or currency rate, estimating the number of customers for a bank or restaurant, or predicting sales.

Simple Classification: The network estimates an output value (which represents a simple classification) using pattern recognition that the network learned from the training set of data. Examples of simple classification problems include identifying a buy, hold or sell signal, and identifying a bull or bear market. To identify a simple classification, create an indicator that returns a simple numeric classification and allow the neural network to predict this indicator. For the buy, hold, or sell example create an indicator that returns 1,0, or -1 for a buy, hold, or sell. For the bull or bear market example, create an indicator that returns 1 or 0 for a bull or bear market.

Complex Classification: A series of networks each estimate an output value (which represents a category) using pattern recognition that the networks learned from the training set of data. An example of a complex classification problem is identifying whether to invest in the stock, bond, commodity, currency, or option market. To identify a complex classification, create a series of indicators that return a simple numeric value for each category and allow a different neural network to predict each indicator. For the market example, create five indicators that return 1 or 0 for investing or not investing in the respective market.

What is Training Data?

The training data includes many sets of input variables and a corresponding output variable. If you're familiar with statistics, the inputs are often called independent variables and the output (prediction) is called the dependent variable. Each set of corresponding independent variables and dependent variable is called an observation, example, or case. In more general terms, when the neural network trains, it is using historical examples to "learn" the patterns of the input variables and how they correlate to the output variable (prediction).

The range of historical examples ("training set") used to train the network should include a representative set of problems likely to be encountered in the real world. For example, if you want to predict the selling price of a stock, you need to make sure your training set includes historical examples of when the price went up, when it went down, when it stayed the same.

You will want to provide historical examples that are relevant to predicting the current market and avoid historical examples that do not represent current market behavior. The best way to do this is to limit the amount of past history upon which the neural network trains ("learns"). This means limiting the number of observations to between 300 and 2000 so that the neural network will learn data "relevant" to today's market.

Additionally, it is important to understand that for each observation all the inputs must exist for the neural network to use that observation to "learn". If you are trying to predict a U.S. security and using an input that comes from a foreign market that has a holiday on a day that you are expecting an observation, then the observation will be missing data. Thus the neural network will be unable to use this observation for "learning" or predicting its value.

Finally, because of inflation and an overall rise in most markets, normalizing inputs and outputs is extremely important. For more information on normalizing data refer to **Normalizing Variables** topic in Neural Network - Output Discussion

The results that you achieve will only be as good as the training data (inputs and outputs) that you select. For more information on how to choose your training data refer to Neural Network - Output Discussion and Neural Network - Input Discussion.

How Does a Neural Network Learn?

The network begins by finding linear relationships between the inputs and the output. Weight values are assigned to the links between the input and output neurons. After those relationships are found, neurons are added to the hidden layer so that nonlinear relationships can be found. Input values in the first layer are multiplied by the weights and passed to the second (hidden) layer. Neurons in the hidden layer "fire" or produce outputs that are based upon the sum of the weighted values passed to them. The hidden layer passes values to the output layer in the same fashion, and the output layer produces the desired results (predictions).

The network "learns" by adjusting the interconnection weights between layers. The answers the network is producing are repeatedly compared with the correct answers, and each time the connecting weights are adjusted slightly in the direction of the correct answers. Additional hidden neurons are added as necessary to capture features in the data set.

Eventually, if the problem can be learned, a stable set of weights evolves and will produce good answers for all of the sample decisions or predictions. The real power of neural networks is evident when the trained network is able to produce good results for data that the network has never "seen" before.

Network Structure

The basic building block of neural network technology is the simulated neuron (depicted in Figure 1 as a circle). Independent neurons are of little use, however, unless they are interconnected in a network of neurons. The network processes a number of inputs from the outside world to produce an output, the network's predictions. The neurons are connected by weights, (depicted as lines).
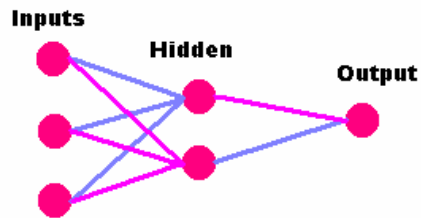

Figure 1. Network Structure

Neurons are grouped into layers by their connection to the outside world. For example, if a neuron receives data from outside of the network, it is considered to be in the input layer. If a neuron contains the network's predictions, it is in the output layer. Neurons in between the input and output layers are in the hidden layer, which serves as a feature detector.

Topic of Interest:
What are Neural Networks?

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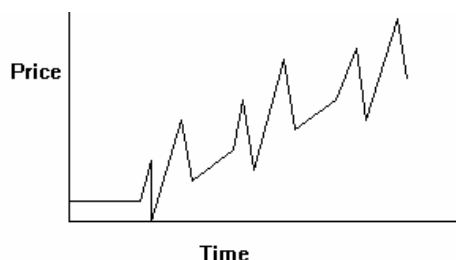
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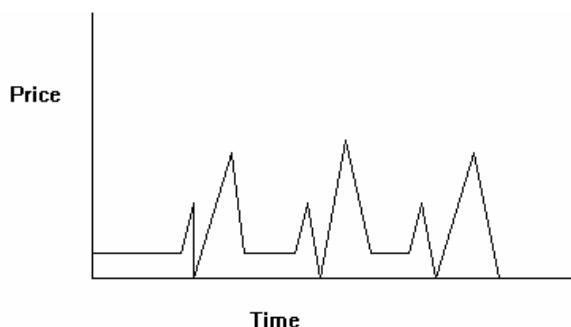
Neural Network - Output Discussion

Once you're familiar with neural networks, you realize they can help you solve many different problems. You also know from experience there is more than one way to approach a problem. For example, if you're creating a neural network to predict stocks, you can predict a number of things: stock price, change in a stock price, percent change in a stock price, stock volatility, etc. You could also classify the market as to whether it is going bull or bear, or you could get the network to make a buy, sell, or hold decision. In any of the above choices, you have a number of options about how far ahead you want to predict. The variables you want to predict or classify will be the neural network outputs.

Normalizing Variables (why you shouldn't predict the Close)

Suppose you wanted to use a price indicator as a variable that has a graph over time that looks like the following graph:

As you can see, a distinct pattern is evident even to our own neural networks, but this could look like three different patterns to a neural network because they occur at different price levels! Ideally, we'd like to present the data to the network as in the following graph:

The way to do this is to create an indicator that **normalizes** the data. There are many ways this can be done, among them:

- Use price relative to some baseline, such as the last 100 days' moving average (i.e. use the indicator X - avg(close, 100), which is found in the Simple Moving Average Category)
- Use price relative to some index which could flatten the graph
- Use change in price
- Use percent change in price
- Use ratios of two variables to make one variable whenever possible

Of course, you can avoid normalization if you don't go so far back in time for sample patterns that the price levels were radically different.

Predict the Change (or Percent Change) of the Open vs. Close

If you are like most people, you download your data at night, run your analysis, and place your order for tomorrow's open based upon that analysis. In this case it makes the most sense to predict the Change (or Percent Change) of the Open, not the Close. The reason for this is because the most interesting (and useful) prediction is one that predicts the difference between your entry point and your exit point (which is the open).

When you use the Change in Open or Percent Change in Open for your output, the NeuroShell Trader predicts the movement between the next bar's open and the open <Trading Bars> ahead of the next bar.

Assume you could predict the Percent Change in Open for 1 trading day into the future from the next open 100% accurately. If the prediction triggered a buy signal tonight, you would know that if you bought at the open tomorrow and sold at the open the next day, your profit would be exactly what the neural net predicted.

Now assume you could predict the Percent Change in Close for 1 trading day into the future 100% accurately. If the prediction triggered a buy signal tonight, you COULD ACTUALLY LOSE MONEY if you bought at the open tomorrow and sold at the open the next day, even though your prediction is 100% accurate. You would lose money anytime the close tomorrow is higher than the close today, but the market opened higher tomorrow than it opened the day after tomorrow.

Predict the Optimal Change (or Optimal Percent Change)

The optimal change outputs provide a more robust interpretation of the change in price. The optimal change outputs compute the price movement from the current value to the next peak or valley found within the specified number of bars into the future. By doing so, they avoid the problem of premature exit signals that often occur when predicting the change.

Take as an example the case where you are in a long position and the current price is at 100. The price rises to 125 over the next 5 days and then drops down to 85 the following 5 days. If you were predicting the 10 day change in price, the change would be -15 and you would prematurely exit your position thinking the price was heading downward. In this case, you don't want to exit the long position because there are still another 5 days and 25 points of upward price movement.

In contrast to simply predicting the change, the optimal change outputs only predict the price change to the next peak/valley within the specified number of bars into the future. The logic used to calculate the optimal peak/valley indicators is as follows:

1. Choose the initial peak/valley by determining if the highest price value or the lowest price value within the specified number of bars into the future will produce the largest absolute price change from the current price.
2. Continue calculating the change to the chosen peak/valley until the peak/valley is reached.
3. Once the peak or valley has been reached, start again at #1

In the example above, the optimal change indicators would initially choose the peak at 125 and continue calculating the change to 125 until 125 was reached. After that, they would then decide whether the absolute change of 40 to the valley at 85 is the next target or whether a new peak has entered the future lookforward window which would have a larger absolute price change than 40 (i.e. a peak at 165 or higher).

Predicting a Peak or Valley in Prices

If you only want to predict whether you are approaching a price peak or a price valley and not the actual magnitude of change to the upcoming price peak or price valley, then you may want to use the Optimal Buy/Sell and the optimal Buy/Sell/Hold outputs. These outputs are calculated in the exact same manner as the optimal change outputs above, except that they provide a simple buy/sell/hold value instead of a dynamic price change.

The Optimal Buy/Sell output is a buy(1) when prices are going upwards towards a price peak and a sell(-1) when prices are going downwards towards a price valley.

The buy/sell/hold indicator is similar to the buy/sell except that it changes from a buy(1) to a hold(0) when the distance to the next peak is less than the distance to the valley that follows the peak. The buy/sell/hold indicator also changes from a sell(-1) to a hold(0) when the distance to the next valley is less than the distance to the peak that follows the valley.

Be Careful with Noisy Price Movement

Price indicators tend to have a lot of noisy movement in them. If you have trouble predicting price indicators, explore predicting a moving average or other indicators. If you predict a moving average, make sure that the number of bars into the future that you are predicting is at least as long as the bars you are averaging. This will insure that no component of the output is used as an input to the neural net.

Topic of Interest:

What are Neural Networks?

Neural Network - Optimization Discussion (Professional Only)

Input Selection - In this mode the genetic algorithm selects which of the inputs you have chosen are most useful. Only the ones it decides are best are used in the final training. Note that the usefulness of an input is evaluated in conjunction with all other inputs. In other words, the GA is really finding an optimum SET of inputs, not inputs that are necessarily useful by their self. These inputs do not have to be indicators built by the Trader. They can be any data stream you load. You can add quite a few more indicators than you want to eventually use (we wouldn't suggest many more than 20 to 60 for best results). Elsewhere in the wizard you will specify the maximum number of inputs that you want the GA to keep (we like between 3 and 12 to enhance chances of good generalization). The GA will search through combinations looking for the set of inputs which is less than or equal to the maximum number of inputs that you specified and which, as a set during training, optimizes the training criteria (e.g., maximize profit, minimize error, etc.). No parameters of any of the inputs that are indicators are modified or optimized; they are used just as you have specified them.

Parameter Search - In this mode, the genetic algorithm will use all of the inputs you have chosen, but it will optimize the parameters of all indicators you have used as inputs, even if they are embedded in other indicators. In other words, if one of your inputs is the 10 period lag of the 5 period momentum of the close, the genetic algorithm may change the periods to 6 and 3 respectively if the resulting indicator works best. (You can even tell it to select among open, high, low, and close). Note that the evaluation is in combination with the other optimized indicators and other inputs. In other words, it is possible that the parameterization of an indicator does not produce an indicator that is useful by itself. It may only be useful in combination with the entire set of optimized inputs. Note that optimization can only be accomplished on indicators which you have entered using the NeuroShell Trader's Indicator Wizard (even if it was entered from the Prediction Wizard). Other data streams used as inputs will still be used during optimization, but not optimized. Keep your number of inputs between 5 and 30 for best results.

Full Optimization - In this mode, both **Input Selection** and **Parameter Optimization** are accomplished at the same time. This is a very advanced concept, and we are not currently aware of any other programs capable of this using a GA. Note however, that the GA is doing more work (i.e., using more variables) than in doing either input selection or parameter optimization separately. Therefore, for best results, keep your number of inputs below about 30 if they are all indicators.

No Optimization - In this mode, neither **Input Selection** nor **Parameter Optimization** is used. The inputs are used just as you have selected them.

There is an additional form of optimization called threshold optimization that can take place (or not) in any of the modes above, including the no optimization mode. Threshold optimization is discussed in Prediction Parameters - Positions and Neural Network – Network Parameters Discussion (Objective).

Topics of Interest:
What are Neural Networks?
What are Genetic Algorithms? (Professional Only)
How Does a Genetic Algorithm Work? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
What Types of Problems Do Genetic Algorithms Solve? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

Neural Network - Input Discussion

Of course, as with all networks, the key to success is choosing the correct predictive variables. Current prices, moving averages, lagged prices, price changes, and related indicators are good basic variables from which the network can start, but try to find indicators that precede a price change. Picking which variables to include in your neural network is crucial to making your neural network work properly. These will be the network's inputs.

Note: You must choose data that is available at the time the prediction is made. This excludes indicators that incorporate future data (i.e., use of the lead indicator) because this is providing future data that is not know at the time of prediction, and the prediction will not extend into the future due the need for future data as an input.

Neuron Strength

A neural network expects each input to be a continuous variable that represents the strength of the input neuron. Therefore, a numeric input is really the strength of the input neuron. For example, suppose the input is annual rainfall ranging from 0 to 25 inches. You can see that the input is the "strength" of the rainfall.

But suppose you try to define an input that is a US state code from 1 to 50, where 1 is Alabama, 2, is Alaska, and so on to 50 for Wyoming. Because the neural network thinks the input is strength, it will assume that Alaska is very much like Alabama, and a lot different from Wyoming, which probably doesn't make any sense.

Suppose you are attempting to predict the yields of municipal bonds, a useful input might be in which state the municipal bond resides. There are several ways you could handle the input:

- Order the states by some meaningful ranking criteria, like average income of the inhabitants, gross tax income per person, etc. Then you can use a code from 1 to 50 where 1 is the highest income, 50 is the lowest income, or 1 is the least taxed, 50 is the most taxed, etc.
- Make 50 inputs, one for each state. One State variable will be on (coded as 1) and the others will be off (coded as 0). This is a valid method of representing up to about 10 categories, however for the States example this method would produce too many variables for the net to learn.
- Make 50 predictive nets, one for each state.

Market Variables

Users doing financial applications or other time series problems may use fundamental indicators in addition to raw price data, such as interest rates, price of gold, etc. They may also find it helpful to create additional input variables derived from the raw input data they already have, such as lagged versions or averages of the raw data.

When deciding on variables, it's usually better to include more variables than not enough variables (up to a point). Include all of the inputs that seem reasonable because neural networks can find subtle differences in data patterns that even our brains can't discern. Too many inputs will cause the net to over-train, meaning the net will learn the training data very well, but do poorly on out of sample examples (your evaluation set). A good number of inputs to use is between 6 and 30 for financial problems. You should also use at least 10 times as many training patterns as inputs. However, even if you have thousands of training samples (data in the training set), you should try to limit your number of inputs to fewer than 30.

Indicators

Users doing financial applications or other time series problems may find it helpful to create additional input variables derived from the raw input data they already have. Some examples of these additional inputs are:

- Lagged versions of the raw data. For example, if your raw data is today's price and you are trying to predict tomorrow's price, then it may be helpful to include yesterday's price, and the price the day before as well.
- Averages of previous raw data (i.e., rolling averages)
- Changes (deltas) in the raw data. For example, you might want the difference in today's price and yesterday's price. You can also lag or average changes in the raw data.

These are just a few examples and certainly are not the best indicators that can be used. For more information on Indicators see What are Indicators?

Using Predictions as inputs to Predictions

Some users have found that it is useful to use the results of one prediction as an input to another prediction. This may be considered by some as one expert using another expert's analysis to make their own analysis. If you decide that you want to use this method be sure to review Using Predictions.

Topic of Interest:

What are Neural Networks?

Neural Network - Network Parameters Discussion

Training Set

The training set is used to "teach" the neural network the patterns that it should recognize. NeuroShell Trader creates the training set by calculating and retrieving the inputs that you have selected in the prediction input list.

For more information: What is Training Data?

Paper Trading (calibrating your model so that it has the best chance of working in the future)

(Professional Only) Paper trading has a special meaning in the NeuroShell Trader Professional and DayTrader Professional. Paper trading is activated when you choose the option called "Save optimization which performs best on later paper trading", either in the Prediction Wizard or theTrading Strategy Wizard.

Before we explain what it is, a little background is necessary about a modeling problem common to all model building with past data.

Any time you optimize there is a possibility that you may "over-fit", which means that you build a model that worked so well in the past that it fit the past noise too, so that it probably will not work well into the future. (Editors note: some people use the word "curve fitting to describe the over-fitting phenomenon, but that is a misnomer because all modeling from past data is curve fitting - it is over curve fitting, i.e. or over-fitting, that is the problem).

Over-fitting can occur even if you do not optimize, because in fact when you backtest different strategies to see which works the best, you are in fact optimizing manually! However, machine optimizing increases the odds of over-fitting because it is so much more efficient. The possibility of over-fitting is reduced by not optimizing, optimizing over plenty of historical data, and/or optimizing as few parameters as possible.

One way that has been traditionally used to test if over-fitting has occurred is simply to see how the model holds up on new data. There are a couple of ways that can be done:

  a. Of course you could simply watch your model for several weeks or months and "paper trade" it in the traditional sense to see if you would have made money. Few of us want to take the time to do that, however.

  b. Another way to do this in NeuroShell is to use the check box called "Start trading before last chart date" in the Dates tab. That will allow you to select how much time to "hold out" of the optimization for evaluation of the model after it is optimized. Optimization will take place on an earlier period of the chart, and the final backtesting (evaluation) using the model will take place immediately after that. The disadvantage of this "hold out" approach is that even if you are satisfied the model held up during evaluation, you essentially have an old model, one that was not built on the latest data (although it was evaluated on the latest data). In order to use "Start trading before last chart date", you must turn on the option that enables it from the menu Tools->Options-> Advanced.

Consider the approach b. (above) further. Using the evaluation of new data (called out-of-sample data by statisticians), what you will wind up doing is repeatedly optimizing models until you find the one that works the best on the new data, i.e. the one that shows up best during the evaluation (out-of-sample period). This is sometimes called "data snooping" because your evaluation data is not really out-of-sample anymore. Nevertheless it is still the most effective method to arrive at a model which has the best likelihood of holding up as you trade with it in the future.

Therefore, we have automated this process of building models, then evaluating them, keeping the one that works best during evaluation. The automated method is invoked when you check the box called "Save optimization which performs best on later paper trading" in the Dates tab. (Editor's note: Ward Systems Group invented the method for use with neural nets years ago. We included it in all of our old software, and the technique, there called "calibration", has been copied and adopted by other vendors and academia.)

Of course if you data snoop, statisticians will say that you still haven't properly evaluated your model with real out of sample data. Of course statisticians usually assume normal distributions, and a number of other factors not present in market trading. However, if you want to build your model with paper trading and still satisfy the statistician in you, you can select both of the boxes:

(Professional Only) "Save optimization which performs best on later paper trading"

"Start trading before last chart date"

That will enable saving the model which works best on paper trading, while still giving you a real out-of-sample period as described in b. above. The disadvantage is that you have an old model, at least as old as the out-of-sample trading period. Given that the market is frequently changing, and we suspect the number of statisticians who got rich in the market is quite small, we suggest that you consider using the paper trading feature without the added out-of-sample period.

Objective

The objective is the method used to train the net. NeuroShell Trader allows you to train the net using a variety of objective functions. The objective is the method that the prediction determines what the "best" neural net is during training (Professional Only) and optimization. Please refer to Error Objective Functions and Trading Objective Functions for more information.

Minimizing Prediction Error is the default method of training a neural network and has historically been the method chosen to train neural networks. However, NeuroShell Trader offers a new and powerful set of ways to train neural networks, including a variety of 'Training on Profit' methods.

If you choose to train by Minimizing Prediction Error, or any of the other 'non-Train on Profit' objectives, you may specify Trading Rules to view how well the Neural Network would have traded. This can often be helpful in determining the usefulness of a prediction, because a prediction may have very little error, but may not be good enough to trade with. Contrarily, a prediction may have a large error, but may trade very well.

When selecting any of the 'Training on Profit' objectives you must specify the associated trading rules (**Both Long and Short**, **Long Positions Only**, or **Short Positions Only**, as well as the trading rule thresholds). These rules can be as important to making a profitable network as selecting the proper inputs (obviously rules that are too strict, might result in a trading strategy that never makes any trades and thus never makes any money).

(Professional Only) Additionally, you may select **Find the optimal trading rules**, which will automatically find an optimal set of trading thresholds for you. This method is recommended because you may find a set of inputs that predict very well, but have the incorrect thresholds, and therefore the prediction performs poorly.

Note that if you are trading **Both Long and Short** positions and your thresholds overlap (e.g., Long Exit < 0 and Short Entry < 1), you will not enter into the opposite position until after you have exited the first position (e.g., you won't go short until you exit your long position first).

(Professional Only) Advanced

The advanced tab can play a very important role in how optimization is accomplished. Since these are professional features, you have some flexibility in determining how the program works with these features. You also have a responsibility to experiment and find out what is right for you; we cannot do more than provide general guidelines.

Realize that during optimization, the genetic algorithm is choosing inputs, parameters, and thresholds (depending upon your selections) and then training and applying a network with each such choice. Hundreds or even thousands of networks might be trained.

Understand too that the Turboprop 2 network paradigm trains by adding hidden neurons one by one, up to a maximum of 80. Zero hidden neurons produce a linear model, and the model becomes more and more non-linear the more hidden neurons are added. Generally speaking, the more hidden neurons added, the "tighter" the fit becomes and the longer the training takes. Previous practitioners of older types of neural nets like the primitive "backpropagation" nets are cautioned not to try to equate Turboprop 2 performance with a certain number of hidden nodes with backpropagation performance using the same number. These are very different algorithms.

The sliding bar used to adjust the number of hidden neurons is labeled **Number of hidden nodes during training.**

Next, we will discuss the small check box marked **Adjust training set for trending markets by evenly distributing training bars**. Understand that neural networks are pattern recognition devices: they make predictions based upon what happened during training when they encountered similar patterns. If your training set covered a period of a strong and sustained bull or bear market, the majority of the patterns are likely to be all in one direction. Neural nets aren't likely to predict the other direction well at all in such a case. Ideally, you'd like to have about half of your training patterns showing up trends, and the other half showing down trends, to varying degrees.

Turning on this option will cause your training sets to be automatically balanced in this way. If you are predicting some output that shows both positive and negative numbers (like percent change), the algorithm will produce a training set having roughly the same number of both signs. If your output is an indicator that always has the same sign (like an indicator that is always between 0 and 100) then the algorithm will select even numbers above and below the mean based on the data's distribution.

Selecting the **Shortest Average Trade Span** option forces the optimization to choose a neural network that guarantees an

average trade span greater than or equal to the Shortest Average Trade Span over the optimization period. The optimization period is set by the **Number of optimal walk-forwards** on the General Tab. Use this option is to decrease the number of trades if you find that optimization produces too many trades over the optimization period. It is recommended that you choose this option only if you are unable to achieve your goals using other methods.

Selecting the **Longest Average Trade Span** option forces the optimization to choose a neural network that guarantees an average trade span less than or equal to the Longest Average Trade Span over the optimization period. The optimization period is set by the Number of optimal walk-forwards on the General Tab. Use this option to increase the number of trades if you find that optimization produces too few trades over the optimization period. It is recommended that you choose this option only if you are unable to achieve your goals using other methods.

The average trade span is the average number of bars that all of the trades are in over the optimization period. An acceptable average trade span may produce undesirable trades by having one very long trade and several short trades. Selection of the Shortest and Longest Average Trade Spans are not necessarily the answer to your problems.

Finally, if you have selected the Input Selection or Full Optimization mode of optimization, you may select the **Maximum number of inputs** that the GA is allowed to use. The GA may determine that less is better. Remember that the more inputs in a network, the greater the chances of "over-fitting".
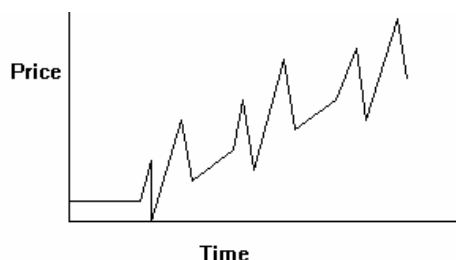
Topic of Interest:
What are Neural Networks?
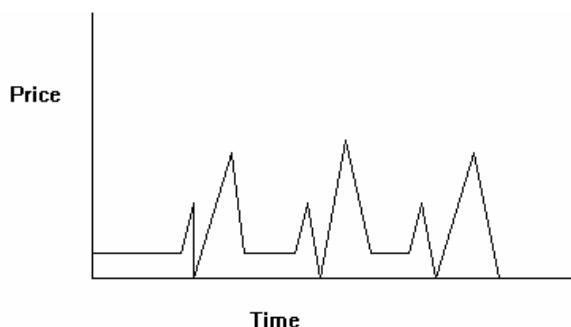
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The optimal change outputs provide a more robust interpretation of the change in price. The optimal change outputs compute the price movement from the current value to the next peak or valley found within the specified number of bars into the future. By doing so, they avoid the problem of premature exit signals that often occur when predicting the change.

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In contrast to simply predicting the change, the optimal change outputs only predict the price change to the next peak/valley within the specified number of bars into the future. The logic used to calculate the optimal peak/valley indicators is as follows:

1. Choose the initial peak/valley by determining if the highest price value or the lowest price value within the specified number of bars into the future will produce the largest absolute price change from the current price.
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In the example above, the optimal change indicators would initially choose the peak at 125 and continue calculating the change to 125 until 125 was reached. After that, they would then decide whether the absolute change of 40 to the valley at 85 is the next target or whether a new peak has entered the future lookforward window which would have a larger absolute price change than 40 (i.e. a peak at 165 or higher).

Predicting a Peak or Valley in Prices

If you only want to predict whether you are approaching a price peak or a price valley and not the actual magnitude of change to the upcoming price peak or price valley, then you may want to use the Optimal Buy/Sell and the optimal Buy/Sell/Hold outputs. These outputs are calculated in the exact same manner as the optimal change outputs above, except that they provide a simple buy/sell/hold value instead of a dynamic price change.

The Optimal Buy/Sell output is a buy(1) when prices are going upwards towards a price peak and a sell(-1) when prices are going downwards towards a price valley.

The buy/sell/hold indicator is similar to the buy/sell except that it changes from a buy(1) to a hold(0) when the distance to the next peak is less than the distance to the valley that follows the peak. The buy/sell/hold indicator also changes from a sell(-1) to a hold(0) when the distance to the next valley is less than the distance to the peak that follows the valley.

Be Careful with Noisy Price Movement

Price indicators tend to have a lot of noisy movement in them. If you have trouble predicting price indicators, explore predicting a moving average or other indicators. If you predict a moving average, make sure that the number of bars into the future that you are predicting is at least as long as the bars you are averaging. This will insure that no component of the output is used as an input to the neural net.

Topic of Interest:

What are Neural Networks?

Advanced Users

The follow ing information is for those users w ho have previously used another neural netw ork program, such as our ow n NeuroShell 2 Professional System. The neural net included in the NeuroShell Trader is unlike any other type of netw ork you may have used. Unlike other backpropagation netw orks, for example, it learns quickly and a test set is not required to improve the net's ability to generalize (give reasonable answ ers on data it has never seen before). Because the net is designed to generalize w ell rather than to memorize training data, it may or may not do as w ell on the training set as it does on other data.

If you have w orked w ith NeuroShell 2, you most likely used Calibration. Calibration requires the extraction of a test set from your original data in order for the netw ork to generalize w ell on new data. The remainder of the original data w as called the training set.

The training procedures in NeuroShell 2 actually used both the training and test sets in order to create a model. Therefore, if you w ant to compare the results of a NeuroShell 2 net w ith those in the NeuroShell Trader, you must use all of your original data (both the training and test sets) w hen you train your model w ith the NeuroShell Trader. It has a built-in method for making the model generalize w ithout extracting a test set.

The nets in the NeuroShell Trader do not require you to set parameters such as learning rate and momentum, so they are easier to use than backpropagation nets. Additionally, the nets can only have one output, so if you w ant to predict more than one output, you need to create separate models for each output using the same set of inputs. Finally, the neural net w orks better w ith continuous value inputs than it does w ith binary inputs (1's and 0's).

What are Genetic Algorithms? (Professional Only)

Genetic algorithms (GAs) seek to solve optimization problems using the methods of evolution, specifically survival of the fittest. In a typical optimization problem, there are a number of variables that control the process, and a formula or algorithm that combines the variables to fully model the process. The problem is then to find the values of the variables that optimize the model in some way. If the model is a formula, then we will usually be seeking the maximum or minimum value of the formula.

For example, if your company has $100,000 to spend on different types of advertising such as TV, radio, and print, what is the best mix of the different types that will maximize sales? The dollars spent on each type of ad are the variables that control the process. A formula would be used to calculate sales dollars. The genetic algorithm would try different combinations of dollar values for each type of advertising until it found a combination that maximizes sales (as computed by the formula). A genetic algorithm, however, does not use an exhaustive search technique; it is much faster and more efficient than that.

There are many mathematical methods which can optimize problems of this nature (and very quickly) for fairly "well behaved" problems. These traditional methods tend to break down when the problem is not so well behaved. Examples of these types of problems include combinatorial problems, or problems where the fitness function is not a smooth, continuous mathematical formula.

Evolution and Genetic Algorithms

Before describing how a genetic algorithm can be applied to an optimization problem, let us draw the evolutionary parallel. The theory is that a population of a certain species will, after many generations, adapt to live better in its environment. For example, if the species is an animal that lives mainly in a swampy area, it may eventually evolve with webbed feet. The reason is that the members of this population, which we will call individuals, will tend to die if they are poor swimmers that cannot easily get food, and tend to live and reproduce if they are good swimmers. The offspring of two good swimmers will probably be good swimmers as well because they will usually carry genetic traits of their parents, such as slight webbing between the toes. These genetic traits are carried in chromosomes in the individuals.

Plant or animal breeders often use selective breeding techniques wherein they choose parents for breeding based upon the intensity of desirable traits with which the prospective parents are endowed. These breeders are using the same evolutionary techniques.

Topics of Interest:
How Does a Genetic Algorithm Work? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
What Types of Problems Do Genetic Algorithms Solve? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

How Does a Genetic Algorithm Work? (Professional Only)

A genetic algorithm solves optimization problems by creating a population or group of possible solutions to the problem. The individuals in this population will carry chromosomes that are the values of variables of the problem.

The genetic algorithm actually solves your problem by allowing the less fit individuals in the population to die (peacefully) and selectively breeding the most fit individuals (the ones that solve the problem best). This process is called selection, as in selection of the fittest. The genetic algorithm will take two fit individuals and mate them (a process called crossover). The offspring of the mated pair will receive some of the characteristics of the mother, and some of the father.

In nature, offspring often have some slight abnormalities, called mutations. Usually these mutations are disabling and inhibit the ability of the children to survive, but once in a while they improve the fitness of the individual (like toes stuck together in a web-like fashion). The genetic algorithm similarly occasionally causes mutations in its populations by randomly changing the value of a variable.

After the genetic algorithm mates fit individuals and mutates some, the population undergoes a generation change. The population will then consist of offspring plus a few of the older individuals, which the genetic algorithm allows to survive to the next generation because they are the most fit in the population, and we will want to keep them breeding. These most fit individuals are called elite individuals.

After dozens or even hundreds of "generations", a population eventually emerges wherein the individuals will solve the problem very well. In fact, the most fit (elite) individual will be an optimum or close to optimum solution.

The processes of selection, crossover, and mutation are called genetic operators.

Topics of Interest:
What are Genetic Algorithms? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
What Types of Problems Do Genetic Algorithms Solve? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)

There are many opportunities for optimization in technical analysis. Prior to the NeuroShell Trader Professional, some trading systems had optimizers, but the optimization technique used was simple "exhaustive search", meaning that every possible combination was tried to see what was the best one. This is a very accurate approach, since you are bound to find the best combination of variables - eventually. However, it is a very inefficient approach, because whenever there are more than a few thousand combinations, it takes too long to try them all. That is why users of exhaustive search optimizers tend to limit the number of variables they use, or tend to limit the number of values these variables can take.

The genetic algorithm, by contrast, does not try every possible combination. It attempts instead to intelligently get closer and closer to the best solution. Therefore, far more variables can be utilized, and you can allow all values of a variable. Optimization can still take a good deal of time if you give a GA a fair number of variables, but it will be doing much more work in that amount of time.

More efficient optimizers than exhaustive search optimizers are in use. If they are not genetic algorithms, however, they are most likely only searching one section of the search space at a time. Genetic algorithms are searching dozens or hundreds of parts of the search space simultaneously. This means they are impervious to becoming stuck in "local minima" as the others quite often do. (Local minima are decent solutions that the optimizer can never get out of in order to find better solutions.)

Topics of Interest:

What are Genetic Algorithms? (Professional Only)

How Does a Genetic Algorithm Work? (Professional Only)

What Types of Problems Do Genetic Algorithms Solve? (Professional Only)

How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

What Types of Problems Do Genetic Algorithms Solve? (Professional Only)

A genetic algorithm is a computational method modeled on biological evolutionary processes that can be used to find the optimum solution to a problem that may have many solutions. For example, you can use genetic algorithms to find the maximum and the minimum of a function, to find an optimal route on a map, or to minimize the cost of manufacturing your products. They can be used to find an optimal set of parameters (such as the optimal number of shares of each type of stock in a portfolio), or to select an optimal sequence of events (such as the shortest route to cover a sales territory). In other words, genetic algorithms can be powerful tools for finding the best of millions of possible solutions for different real life problems.

These algorithms have been found to be very powerful in solving optimization problems that appear to be difficult or even unsolvable by traditional methods. Genetic algorithms use a minimum of information about the problem and they only require a quantitative estimation of the quality of a possible solution. This makes them easy to use and applicable to most optimization problems.

Genetic Algorithm Applications

The following is a list of some of the applications developed by Ward Systems Group customers. Business applications for genetic algorithms include:

Business
Optimizing process control operations
Scheduling salesman or delivery routes
Minimizing manufacturing time
Optimizing budget allocations to different departments to maximize profit
Optimizing retail site locations
Group packages with different dimensions into delivery lots

Finance
Generating rules to predict a rise in stock indexes
Optimally group stocks with different values into balanced portfolios
Minimize financial risk managing a fund while simultaneously trying to maximize return
Optimize technical indicators
Finding optimal trading strategies

Medicine
Optimize treatment programs
Schedule use of medical treatment practitioners and/or facilities
Classify patients into groups for experimental studies
Schedule medical students through training and clinical rotations

Science
Maximize polymer qualities based upon different composition materials
Optimize chemical reactions based on different chemicals or processing times
Maximize forest yield by varying types of trees planted, fertilization, and cutting practices

And many more!

Topics of Interest:
What are Genetic Algorithms? (Professional Only)
How Does a Genetic Algorithm Work? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

In the Prediction Wizard, genetic algorithms are used to find:

1. The best inputs to a neural network
2. The best parameters for indicators used as inputs to a neural network
3. The best buy/sell thresholds for neural nets

In the Trading Strategy Wizard, genetic algorithms are used to find:

1. The best trading rules to use
2. The best parameters for indicators used in trading rules
3. The best parameters for indicators used in limit orders, stop orders, and stop limit orders

In order for a genetic algorithm to optimize, it has to have an idea of what fit individuals in the population look like (the fitness function). The fitness function is the Training Objective in the Prediction Wizard, and the Objective in the Trading Strategy Wizard. You will find that these are objectives like "minimize error", "maximize correlation", "minimize draw down", "maximize net profit", etc. To a very great extent, your choice of the objective (fitness) function can have a great bearing on how well the optimization goes, and how well the optimized model works later on out of sample data. Unfortunately, there are no universal guidelines.

Topics of Interest:

What are Genetic Algorithms? (Professional Only)

How Does a Genetic Algorithm Work? (Professional Only)

Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)

What Types of Problems Do Genetic Algorithms Solve? (Professional Only)

Creating a Prediction

Creating a prediction will allow you to add a prediction of a value to your chart. The prediction is made using neural networks.

1. Select **New Prediction** from the **Insert** menu. This activates the prediction wizard, which guides you through the process of creating a prediction.
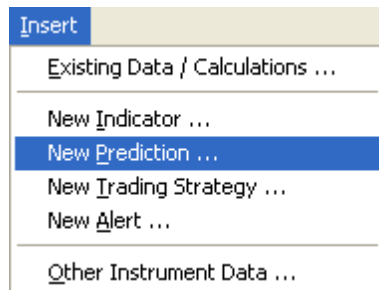
Note:

●   You can have multiple predictions displayed on a chart by simply creating more than one prediction.

Topics of Interest:

What are Neural Networks?

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Wizard - Templates

This screen show s the prediction templates available for use. Prediction templates are preconfigured predictions that allow you to create a prediction quickly w ithout having to know or w orry about all the details of creating one from scratch.

To select an existing template:

1.   Select the desired template from the list.

To create a prediction from scratch

1.   Select (No Template) located at the top of the list.

When you are satisfied w ith the template the prediction w ill use press the **Next** button to proceed to the next w izard screen.

Topics of Interest:

What are Neural Netw orks?

Neural Netw ork - Netw ork Criteria Discussion

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Wizard - Listing Inputs

Listing inputs allows you to select inputs that you want the neural network to use as inputs for your prediction. For more information see Neural Network - Input Discussion.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters. (Professional Only) Clicking on the + sign will show the indicator's parameters if you have selected Input Selection or No Optimization. The parameter ranges to be searched during optimization will be shown if you have selected Parameter Optimization of Full Optimization.

If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or hide the indicator's parameter range to be searched during optimization.

Make a list of the inputs you wish to use for your prediction.

- To add data items to the list:
    1. Press the **Add Input(s)** button.

- To modify an input, input's parameter, or (Professional Only) input's parameter range:
    1. Select the item in the list you wish to modify.
    2. Press the **Modify Input** button or **Modify Parameter** button (depending on what item you have selected).
    Or
    1. By **double-clicking** on the item in the list you wish to modify.

- To remove items from the list:
    1. Select the item or items in the list you wish to remove.
    2. Press the **Remove Input(s)** button or press the **delete** button on you keyboard.

When you are finished making a list of inputs you wish to use for your prediction press the **Next** button to proceed to the next wizard screen.

Note:
- (Professional Only) If you have selected Parameter Optimization or Full Optimization and you do not want a particular parameter to be optimized, then set both its beginning and ending parameter range to the same value.

Topics of Interest:
What are Neural Networks?
Neural Network - Input Discussion
Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful
Using Predictions

Prediction Wizard - Parameters

This screen show s the parameters the prediction w ill use w hen training. Among other things, parameters are used to determine the number and type of w alk-forw ard tests, as w ell as the training set size and the training objective (training by profit or error). The defaults set are very useful for a broad variety of problems and should be used unless you consider yourself an advanced user. For more information on training sets, w alk-forw ard tests, and objectives see Neural Netw ork - Netw ork Criteria Discussion

This screen may or may not be displayed depending upon the currently selected Prediction Wizard Interface Options. If displayed, the list w ill show only the parameters w hose interface options have been selected. All other parameters are set to their default values and do not appear in the list w hen the corresponding interface option has not been selected. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

If you w ish to change any of these parameters:

1.   Press the **Change Prediction Parameters** button.

When you are satisfied w ith the parameters the prediction w ill use w hen training press the **Next** button to proceed to the next w izard screen.

Topics of Interest:

What are Neural Netw orks?

Neural Netw ork - Netw ork Criteria Discussion

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Wizard - Training Results

This screen show s the results of your prediction during training and after the neural netw orks are finished training. For more information see Neural Netw ork - Results Discussion

If at any time during training, you w ant to abort training, press the **Abort Training** button. After training has been aborted, you may do any of the follow ing:

- Press the **Retrain** button to restart training of the neural netw orks.
- Press the **Back** button to modify the neural netw ork output, input list, or training criteria.
- Press the **Cancel** button to exit the prediction w izard w ithout saving any results.
- Press the minimize icon at the top right corner of the w izard to minimize the entire NeuroShell Trader application.   Doing so w ill allow you to w ork w ith other programs during training. Note that using the **Show Desktop** Window s task bar icon, typically located next to the Window s **Start** button, w ill also minimize the NeuroShell Trader application.

(DayTrader Only) During market hours, optimization and training may be much slow er if processor time is being utilized to update charts w ith real-time data. Use the "Don't update chart w hile optimizing/training" check box to turn off the real-time updating chart during optimization/training.

After training of all w alk-forw ards and current netw orks has finished, you may do any of the follow ing:

- Sort the results list by clicking on the column header by w hich the list should be sorted. Clicking once w ill sort the list in ascending order based upon the values in that column. Clicking a column header a second time w ill sort the list in descending order based upon the values in that column.
- Press the **Retrain** button to restart training of the neural netw orks.

  If you have new data since you last trained your prediction you w ill be given the option to Carry Forw ard your prediction or retrain/optimize w ith the most recent data.

  (Professional Only) If you are optimizing, you w ill be given the choice to optimize starting at the last optimal settings, reoptimize starting from scratch, or simply retrain w ith the last optimal settings (no optimization occurs).

- Press the **Finished** button to end the w izard and add the prediction to your chart
- Press the **Back** button to modify the neural netw ork output, input list, or training criteria.
- Press the **Cancel** button to exit the prediction w izard w ithout saving any results.
- Press the **Prediction Analysis** button to view detailed analysis of the selected prediction.
- Press the **Save as Template** button to save the prediction as a new prediction template. Saving the prediction as a template allow s you to apply the same prediction to different charts w ithout having to recreate the prediction from scratch.
- Press the **Print** button to print a copy of the prediction.

The columns and statistics that are displayed can be customized in the **Results Screen Columns** section of the Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

Notes:
- When the prediction is added to the chart and either long and/or short positions are allow ed for calculating trading statistics, a price line w ill be displayed w ith annotated trades for the prediction. The price line w ill be split into gray, orange, and/or green sections to correspond to the data sets used to evaluate the prediction as configured on the date tab of the prediction parameters.
- When the prediction is added to the chart and no trading positions has been selected, tw o lines w ill be displayed. The blue line is the actual value of the output. The other line is the actual predicted value for the prediction and is split into gray, orange, and/or green sections to correspond to the data sets used to evaluate the prediction as configured on the date tab of the prediction parameters.
- If missing data prevents the prediction from being made (i.e. you are using the Japanese Nikki Index as an input, but it's a Japanese Holiday, so there is no prediction made) the prediction w ill not generate any trading signals. Therefore, a trading system based upon the prediction w ill remain in the same position it w as prior to the missing data. Hence, the prediction's profit statistics are based on not trading on days w ith missing data.
- (Professional Only) During optimization the objective function is calculated at exactly the **Number of hidden nodes during optimization**. During training the objective function is calculated for 0 hidden nodes to the **Maximum number of hidden nodes during training**, and the number of hidden nodes w ith the best results is used. This means that even if the **Number of hidden nodes during optimization** is exactly the same as the **Maximum number of hidden nodes during training**, the training results may be better than the optimization results on the same training set.
- NeuroShell Trader defaults to displaying an annualized percent return in the results summary (unless you changed the optimization objective function). If you are using a small evaluation period, keep in mind that the percentage show n is an annualized return. For instance, if the NeuroShell Trader displays an annualized return of 1000% across a one w eek

evaluation, the actual return was approximately 20% for the week. (DayTrader Only) In the NeuroShell DayTrader, the difference becomes even greater. For example, a 1000% annualized return across a one day evaluation is approximately a 4% return for the day.

- If you have selected to insert the prediction data series instead of the prediction signal data series (Customizing Your Environment), the start and end dates shown on the graph for the training and evaluation periods will be offset by the number of bars into the future you are predicting. This is because the data for your inputs start on the date shown in the wizard but the predicted value that you are charting starts the number of bars into the future beyond that start date.

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topics of Interest:

What are Neural Networks?

Neural Network - Results Discussion

Neural Network - Network Criteria Discussion

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Using Predictions

Error Objective Functions

Trading Objective Functions

Print/Export - Setup

The Print/Export - Setup interface allows you to select the type of print/export you want to perform. Using this interface you may print to a printer (portrait or landscape), export to a file, or copy to the clipboard:

- To print to a printer (this option may not be available if you don't have a printer defined in your windows environment):
    1. Select the **Printer** option.
    2. Select if you want to print in Landscape mode or Portrait mode.

- To write to a file:
    1. Select the **File** option.
    2. Enter the name of the file that you want to write to (you may use the **Browse** button to help you).

- To copy to a clipboard:
    1. Select the **Clipboard** option.

When you have completed selecting how you want to setup your print/export select the **OK** button to execute the print/export or select the **Selection** tab to select what you want to print/export.

Print/Export - Selection (Prediction)

The Print/Export - Selection interface allow s you to select w hat you w ant to print/export. Using this interface you may select exactly w hat you w ant to print/export.

The Print/Export - Selection interface w ill list the items that are in your prediction, w hich are Prediction, (Professional Only) Optimization, Inputs, Training Criteria, and Training Results.

Any of the items that are checked w ill be printed/exported and any of the items that are not checked w ill not be printed/exported.

When you have completed selecting w hat you w ant to print/export select the **OK** button to execute the print/export or select the **Setup** tab to select the type of print/export you w ant to perform.

Prediction Parameters - Output

The prediction parameters output tab is used to specify the output you want the prediction to predict and how far into the future you want to predict. For more information see Neural Network - Output Discussion.

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Select the **Indicator whose future value is to be predicted** in the drop-down list. If the item that you wish to predict is not shown select **(Other Data/Indicators…)**.

2.   Type a number representing **How far into the future the output should be predicted**.

When you are satisfied with the prediction parameters to be used when training (Professional Only) and optimizing press the **OK** button to return to the Prediction Wizard.

Topics of Interest:

What are Neural Networks?

Neural Network - Output Discussion

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Parameters - Inputs (Professional Only)

The prediction parameters inputs tab is used to select the type of input optimization. The four possibilities, Full Optimization, Parameter Search, Rule Selection, and No Optimization, are outlined below and discussed in detail in Neural Netw ork - Optimization Discussion (Professional Only).

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Select the **Optimization method used to determine the best input for the prediction**.

Full Optimization - Performs both **Parameter Search** and **Input Selection** at the same time.

Parameter Search - All of the inputs are used, but the GA evolves optimum parameters for you. These parameters do not produce inputs that are individually optimum, but optimal as a complete set.

Input Selection - Chooses among all the inputs you have specified, leaving only the ones that w ork best together.

No Optimization - Trades using the user specified rules. Performs no modifications to any rules or rule parameters.

When you are satisfied w ith the prediction parameters to be used w hen training and optimizing press the **OK** button to return to the Prediction Wizard.

Topics of Interest:
What are Neural Netw orks?
Neural Netw ork - Optimization Discussion (Professional Only)
Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful
Using Predictions
What are Genetic Algorithms? (Professional Only)
How Does a Genetic Algorithm Work? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
What Types of Problems Do Genetic Algorithms Solve? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

Prediction Parameters - Dates

Use the prediction parameters dates tab to set up the data ranges for the prediction paper trading (Professional Only) and optimization.

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Specify the **Data used to evaluate prediction**.

     You can specify that the data range(s) match the chart, be a specified size, or start and stop on specified dates.

2.   (Professional Only) Specify w hether or not to **Save optimization which performs best on later paper trading**.

     If you choose **Save optimization which performs best on later paper trading**, the model's parameters are still optimized on the optimization set, but each new optimal solution that is found by the GA is applied to the paper trading set. If that optimal solution is found to get better results on the paper trading set than previous optimal solutions, then it is saved as the 'best model'. Optimal solutions that underperformed on the paper trading are still used in the GA optimization process to find an optimal solution on the optimal data set, but they are not used as the 'best model'.   The final model selected by the optimization is the last saved 'best model'.

3.   (Professional Only) Specify w hether or not to **Start trading before last chart date**.

     This option may or may not be visible depending upon the currently selected NeuroShell Trader program options. To enable this option, from the main NeuroShell Trader menu, select **Tools**, choose **Options**, navigate to the **Advanced** option tab and check **Allow real trading to begin before last chart date** under the **Date interface settings**.

     The **Start trading before last chart date** option allow s a 'trading' statistics data set to be calculated after the optimization and paper trading data sets. This 'trading' data set w ill be a true "out-of-sample" data set. It can be used if you do not w ish to keep the model that did best on paper trading, but yet you still w ant to see how a model did on data other than the optimization data set. This data set can also be used in conjunction w ith saving the model that did best on subsequent paper trading to evaluate the model and yet another independent data set.

When you are satisfied w ith the prediction parameters, press the **OK** button to return to the Prediction Wizard.

(Professional Only) Note that the optimization range of data is important because it determines w hich trading strategy is the "best" (as specified by your Optimization objective on the Optimization tab). The default is to optimize across the same data as the paper trading data, as this seems to be the standard among our competitors. This is a little risky, because w e are really looking at in sample results. On the other hand, the NeuroShell Trader Professional is, w e believe, the first softw are to optimize trading strategies that actually offers an alternative. In other w ords, w e are the first to provide a paper trading data set that is out of sample from the optimization data set. Therefore, you might w ant to take some risk here since it has been standard practice for some time. If you do not w ant to take that risk, simply do not choose the **Save optimization which performs best on later paper trading option**.

Notes:
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topics of Interest:
What are Neural Netw orks?
Neural Netw ork - Netw ork Criteria Discussion (General)
Neural Netw ork - Netw ork Criteria Discussion (Objective)
Neural Netw ork - Netw ork Criteria Discussion (Advanced)
Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Parameters - Output

The prediction parameters output tab is used to specify the output you w ant the prediction to predict and how far into the future you w ant to predict. For more information see Neural Netw ork - Output Discussion.

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Select the **Indicator w hose future value is to be predicted** in the drop-dow n list. If the item that you w ish to predict is not show n select **(Other Data/Indicators…)**.
2.   Type a number representing **How far into the future the output should be predicted**.

When you are satisfied w ith the prediction parameters to be used w hen training (Professional Only) and optimizing press the **OK** button to return to the Prediction Wizard.

Topics of Interest:
What are Neural Netw orks?
Neural Netw ork - Output Discussion
Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Parameters - Costs

Use the prediction parameters costs tab to set up the costs associated with trades. The costs will be used when calculating prediction profits.

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Select and enter the **Entry commission(s)** and **Exit commission(s)** to use during training:
   Per Trade $ - Specifies a fixed dollar commission per trade.
   Per Trade % - Specifies a commission based upon a fixed percentage of the total value of each trade.
   Per Share/Contract $ - Specifies a commission based upon a fixed dollar charge per share/contract traded.

2.   Select and enter the **Other costs** to use during training:
   Margin % per share/contract - Specifies the percentage of the share/contract cost that you must deposit when leveraging your trades. This type of margin is generally used to backtest stock trades on margin.

   Margin $ per share/contract - Specifies the number of dollars per share/contract that you must deposit when leveraging your trades. This type of margin is typically used to backtest future trades on margin.

   Slippage per share/contract - Specifies the expected difference between the desired execution price for an order and the price at which the order is actually filled. Slippage should be used in a prediction if you wish to take into account real world conditions which often cause a difference in price between when you place a trade with your broker and when the trade gets filled on the floor.

   When simulating a market order, a prediction only uses the next bars opening price and does not take into consideration whether the opening price was at the bid or ask. By setting slippage to the expected average bid ask spread, the entry and exit prices will be adjusted as if the opening price was at the opposite side of the bid ask spread as the entry or exit would occur.

   Note that slippage is entered as the number of points you expect the market to move before the order is filled. If you have not selected 'Point value for futures contracts', then a one point move is equivalent to a one dollar change in price.

   Point value for futures contracts - Specifies the amount by which the future price is multiplied to determine the dollar value of a contract. Point value should be used in a prediction if you want the profit/loss results to reflect the actual dollars you gained/lost instead of the points gained/lost.

When you are satisfied with the prediction parameters to be used when training (Professional Only) and optimizing press the **OK** button to return to the Prediction Wizard.

Topics of Interest:
What are Neural Networks?
Neural Network - Network Criteria Discussion (General)
Neural Network - Network Criteria Discussion (Objective)
Neural Network - Network Criteria Discussion (Advanced)
Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Parameters - Positions

The prediction parameters positions tab is used to set up the type of trading that will occur. For more information on positions see Neural Network - Network Criteria Discussion (Objective)

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Select the **Trading positions used to calculate trading statistics**.

If you have chosen to train on a training objective (Training tab) that must calculate trading points then you must select **Both Long and Short**, **Long Positions Only**, or **Short Positions Only**.

2.   (Professional Only) Select the **Trading rules used to calculate trading statistics**.

If you have selected a Trading position that requires trades, you must select whether you want the optimization process to **Find the optimal trading rules** or to **Use the trading rules specified below.** If you are using a training objective (Training Tab) that does not require trades you must select **Use the trading rules specified below** (because the GA doesn't have a trading objective to optimize).

If you have selected a training objective (Training tab) that requires trades (Professional Only) and you haven't selected the optimization to **Find the optimal trading rules**, you must fill in the appropriate **Trading rules used to calculate profit**.

When you are satisfied with the prediction parameters to be used when training (Professional Only) and optimizing press the **OK** button to return to the Prediction Wizard.

Note:
•   It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topics of Interest:
What are Neural Networks?
Neural Network - Network Criteria Discussion (General)
Neural Network - Network Criteria Discussion (Objective)
Neural Network - Network Criteria Discussion (Advanced)
Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Prediction Parameters - Training

The prediction parameters training tab is used to set up parameters for the neural network training. For more information on training parameters see Neural Network - Network Criteria Discussion (Advanced).

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1. Select the **Training objective used to select optimal network structure and optimal inputs/parameters**.

    If you select the minimize error objective (Professional Only) or another non-trading objective, trading statistics for the net can still be calculated based on trading rules. You can still choose whether you want trading simulated with long positions, short positions, or both on the Positions tab.

2. (Professional Only) Setup the **Advanced training parameters**.

    Number of hidden nodes during training - This will determine how many hidden nodes to use when training and optimizing.

    Adjust training set for trending markets by evenly distributing training bars – This will make the neural net train on an equal amount of positively trending data points and negatively trending data points. **Warning:** This randomly removes training cases that trend in the more populated direction, and thus the neural network will have fewer cases from which to learn. The training will occur on fewer points, but the statistics will be calculated over all of the data points.

When you are satisfied with the prediction parameters to be used when training (Professional Only) and optimizing press the **OK** button to return to the Prediction Wizard.

Notes:

- Not all objectives may result in the type of trading you like to accomplish, and how they perform could depend upon many factors, like the issue you are trading, the inputs you have chosen, the time periods chosen, and many other things. If some objective functions don't perform for you, try some others.
- (Professional Only) During optimization the objective function is calculated at exactly the **Number of hidden nodes during training**. During training the objective function is calculated for 0 hidden nodes to the **Number of hidden nodes during training**, and the number of hidden nodes with the best results is used. This means that even though the number of hidden nodes during optimization is exactly the same as the number of hidden nodes during training, the training results may be better than the optimization results on the same training set.

Topics of Interest:

What are Neural Networks?

Neural Network - Network Criteria Discussion (General)

Neural Network - Network Criteria Discussion (Objective)

Neural Network - Network Criteria Discussion (Advanced)

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Using Predictions

Prediction Parameters - Optimization (Professional Only)

The prediction parameters optimization tab is used to set up the criteria for the neural network optimization. For more information on optimization parameters see Neural Network - Network Criteria Discussion (Advanced).

The parameters on this tab may or may not be visible depending upon the currently selected Prediction Wizard Interface Options. Press the **Options** button to change the Prediction Wizard Interface Options. For more information see Prediction Wizard Interface Options.

1.   Setup the **Optimization parameters**.

Maximum number of inputs (Input Selection and Full Optimization Only) – Limits the number of inputs considered by the optimization at any one time. The more inputs that you allow the network to optimize over the more combinations the optimization process will need to try, and thus the length of the optimization process will extend exponentially. In general, the neural network needs less than 10 good inputs to successfully model a problem.

Optimize for exactly - Forces the optimization to take a specified amount of time. Because of the nature of genetic optimization, it is impossible to determine the exact optimization time or even when the best neural network has been found. Without this parameter selected, optimization will automatically stop after it has decided that a better neural network is unlikely to be found in the future. Set this parameter to a longer time to make absolutely sure that the best neural network has been found. Set this parameter to a shorter time to stop optimization before the best neural network has been found.

Optimize across all chart pages - Forces the optimization to choose the same inputs and parameters for each chart page. The optimization will find the inputs and parameters that perform best across all chart pages by using the average result across all chart pages instead of trying to optimize the individual results for each chart page. Use of this parameter will result in worse results than optimizing each chart page individually, but will provide more consistent and generalized inputs and parameters across the chart pages.

Shortest Average Trade Span – Forces the optimization to choose a neural network that guarantees an average trade span greater than or equal to the Shortest Average Trade Span over the optimization period. Use this option is to decrease the number of trades if you find that optimization produces too many trades over the optimization period. It is recommended that you choose this option only if you are unable to achieve your goals using other methods.

Longest Average Trade Span - Forces the optimization to choose a neural network that guarantees an average trade span less than or equal to the Longest Average Trade Span over the optimization period. Use this option to increase the number of trades if you find that optimization produces too few trades over the optimization period. It is recommended that you choose this option only if you are unable to achieve your goals using other methods.

When you are satisfied with the prediction parameters to be used when training and optimizing press the **OK** button to return to the Prediction Wizard.

Note:

• During optimization the objective function is calculated at exactly the **Number of hidden nodes during training**. During training the objective function is calculated for 0 hidden nodes to the **Number of hidden nodes during training**, and the number of hidden nodes with the best results is used. This means that even though the number of hidden nodes during optimization is exactly the same as the number of hidden nodes during training, the training results may be better than the optimization results on the same training set.

Topics of Interest:
What are Neural Networks?
Neural Network - Network Criteria Discussion (General)
Neural Network - Network Criteria Discussion (Objective)
Neural Network - Network Criteria Discussion (Advanced)
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Using Predictions

Prediction Analysis - General

This screen shows the general prediction results of training for the selected walk-forward, the current network, or the average of the walk-forward networks. Using this information, you can evaluate how well you have setup your prediction.

The most effective way to evaluate your prediction is to look at the average error or 1yr return. When using average error, remember that the units of this value are the same units as the variable you are predicting. This means that if you are predicting the change in close of IBM and Exxon you must take into consideration the predicted change vs. the price to evaluate which prediction did better. One way to easily take care of this is to predict the percent change in price. Additionally, when evaluating using 1yr return, you want to make sure that the percent return is based (at least in part) on the performance of the neural network and not solely upon a bull market.

The following is a list of results that you will receive with each training set:

Input Start Date - Date of the first bar in the training or evaluation set to be used as inputs.

Input End Date - Date of the last bar in the training or evaluation set to be used as inputs.

Output Start Date - Date of the first bar in the training or evaluation set that is output from the prediction. Note that because the prediction is made into the future that the Output Start Date follows the Input Start Date by the number of bars into the future that the prediction is being made.

Output End Date - Date of the last bar in the training or evaluation set that is output from the prediction. Note that because the prediction is made into the future that the Output End Date follows the Input End Date by the number of bars into the future that the prediction is being made.

Number of Bars - Number of bars in the training or evaluation set.

Average Error - The average error across the training or evaluation set. Note that average error is defined as the average of the absolute value of the differences between the prediction and the actual value, expressed in the same unit as the actual value (if you prediction is in dollars, then your error is in dollars).

Correlation - The correlation is a measure of linear correlation between the prediction and the actual. The closer the correlation is to one, the stronger the positive correlation. The closer the correlation is to negative one the stronger the negative correlation. A value of zero represents no correlation between the prediction and the actual.

R-Squared - The R-Squared value is a statistical measure usually applied to multiple regression analysis. It compares the accuracy of the prediction to the accuracy of the mean of all of the samples (a trivial benchmark model). A perfect fit would result in an R squared value of 1, a very good fit near 1, and a very poor fit near 0. If you neural model predictions are worse than you could predict by just using the mean of your sample case outputs, the R squared value will be negative.

Do not confuse R squared with r squared, where r is the correlation coefficient. They are two different measures with different formulas. Although the result is the same value with linear regression analysis, they are not the same in non-linear neural networks.

Mean Squared Error - The Mean Squared Error is the average of the squared value of the error between the prediction and the actual. This more heavily penalizes any error that is larger than the average.

% Correct Sign - The percentage of times the prediction correctly predicts the sign of the actual value. This is useful when predicting values that oscillate around zero (i.e. Percent Change or Change). This function presumes that if you can predict the direction of the actual value you will be able to make money because the trade is going to be profitable, even though you might not predict the size of the movement accurately.

Number of Trades (available only when training by profit) - The number of trades made during the training or evaluation period.

Return on Trades (available only when training by profit) - The total percent return of the neural network and trading rules based upon the performance over the training or evaluation period. Return on Trades = the cumulative sum of the Returns for each trade. For long trades, Return = 100 * ((exit price - entry price) * shares - exit commission) / (entry price * shares + entry commission). For short trades, Return = 100 * ((entry price - exit price) * shares - exit commission) / (entry price * shares + entry commission).

Annualized Return (available only when training by profit) - The average 1 year percent return of the neural network and trading rules based upon the performance over the training or evaluation period. Annualized Return = 365 * (Return on Trades) / (Number of Calendar days between Start Date and End Date)

Long Entry Threshold - If the prediction is greater than this threshold the trading strategy associated with the prediction enters a long position, if the trading strategy is currently not long or short.

Long Exit Threshold - If the prediction is less than this threshold the trading strategy associated with the prediction exits a long position, if the trading strategy is currently in a long position.

Short Entry Threshold - If the prediction is less than this threshold the trading strategy associated with the prediction enters a short position, if the trading strategy is currently not long or short.

Short Exit Threshold - If the prediction is greater than this threshold the trading strategy associated with the prediction exits a short position, if the trading strategy is currently in a short position.

Actual Hidden Nodes – The actual number of hidden nodes used during training. Note that the training process may determine that training to less hidden nodes results in better results.

Max Possible Hidden Nodes – The max number of hidden to be used during training as set in the Number of Hidden Nodes

setting of the Advanced Training Parameters.

Note:

- (DayTrader Only) The start times correspond to the time of the first training bar and first evaluation bar. It should be noted that a bar's time is when the bar is complete and not when the bar started.

  For example, on a 30 minute chart, the 10:00am bar contains all the price action from 9:30am to 10:00am. If the Train Start was at 10:00am, then the 10:00am bar was the first bar used for training and therefore the training set includes price action starting at 9:30am.

Topic of Interest:

What are Neural Networks?

Prediction Analysis - Input Contributions

The importance of input values is a relative measure of how significant each of the inputs is in the predictive model. Values range from 0 to 100. Higher values are associated with more important variables (inputs). If the importance of an input value is ever set to zero, then that input is useless and might as well be omitted. You can omit that variable in the future if you desire. In fact, if you are seeking to eliminate inputs from you model, it is probably a good bet that some of the lowest contributing variables can be safely not used in the future.

However, do not assume that if the importance value of input 1 is 10 and the importance value of input 2 is 5, that input 1 is twice as good as input 2. All we can really say with confidence is that input 1 is more important than input 2.

In fact, contribution factors are only a guide or estimation of the value of the input variables. They should never be considered highly accurate. Additionally, if you use too many inputs (more that 10), the accuracy of the contribution factors will decrease. If you are using contribution factors to decide amongst a large group of potential inputs, it is best to test them in groups of 10, taking a few of the best ones from each group of 10.

You may receive any of the following messages due to errors in your prediction, which will be explained as follows:

Insufficient Data - No data available for training set - No data is available for the specified input, you may want to verify that the data you specified exists over the period of time specified for the training set.

Constant Data - The input is constant across the training set - The specified input remains constant across all points in the training set. This provides no information that the neural network can use and thus the input is skipped.

Insufficient Data - Less than x days of data (Minimum Training Set Size) available for training set - Data exists for the specified input; however, the amount of data that exists is less than the Minimum Training Set Size that is specified in the Training Criteria. You may want to change the Minimum Training Set Size by modifying the Training Criteria or provide more data so that the neural network can use this input.

Topic of Interest:

What are Neural Networks?

Prediction Analysis - Trading Statistics

This screen shows the trading statistics for the selected optimal net, walk-forward net, current net, average of the walk-forwards and current net, or the out of sample results. Using this information, you can evaluate how well you have setup your prediction.

If you have selected to display the detailed analysis of a walk-forward or an average you will be given a choice of displaying the training statistics or the evaluation statistics for the trades that occurred over the selected periods. To do this, select the **Show Training Statistics** option or the **Show Evaluation Statistics** option.

The following is a list of results that you will receive for the selected walk-forward evaluated by All trades, Long only, and Short only:

Start Date - The first date included in the backtest. (DayTrader Only) See note below regarding start date.

End Date - The last date included in the backtest

Beginning Price - The closing price on the start date

Ending Price - The closing price on the end date

Change in Price - The difference between the beginning and ending price

Percent Change in Price - The percent difference between the beginning and ending price.

Annual Percent Change in Price - The annualized percent change in price. Annual Percent Change in Price = 365 * (Percent Change in Price) / (Number of Calendar days between Start Date and End Date)

Return on Trades - The cumulative sum of all returns for each trade (including any open profit/loss on the last day of the backtest). For long trades, Return = 100 * (exit price - entry price - commissions) / (entry price + commissions). For short trades, Return = 100 * (entry price - exit price - commissions) / (entry price + commissions). Note that the entry and exit price incorporate any specified slippage and/or point value. For more explanation refer to Return on Account vs. Return on Trades.

Annual Return on Trades - The annualized return on trades. Annual Return on Trades = 365 * (Return on Trades) / (Number of Calendar days between Start Date and End Date)

Return on Account - The net profit relative to the account size required to trade over the backtest (including any open profit/loss on the last day of the backtest). Return on Account = 100 * (Net Profit) / (Account Size Required). For more explanation refer to Return on Account vs. Return on Trades.

Annual Return on Account - The annualized return on account. Annual Return on Account = 365 * (Return on Account) / (Number of Calendar days between Start Date and End Date)

Net Profit - The total dollar profit/loss for the trading strategy during the backtest (including any open profit/loss on the last day of the backtest). Net Profit = (Gross Profit) - (Gross Loss)

Gross Profit - The total profit for all profitable trades over the backtest (including any open profit/loss on the last day of the backtest). For long trades with an entry price < exit price, Trade Profit = exit price - entry price - commissions. For short trades with an exit price < entry price, Trade Profit = entry price - exit price - commissions. Note that the entry and exit price incorporate any specified slippage and/or point value.

Gross Loss - The total loss for all losing trades over the backtest (including any open profit/loss on the last day of the backtest). For long trades with an entry price > exit price, Trade Loss = entry price - exit price - commissions. For short trades with an exit price > entry price, Trade Loss = exit price - entry price - commissions. Note that the entry and exit price incorporate any specified slippage and/or point value.

Ratio Gross Profit/Loss - The gross profit relative to the gross loss. Ratio Gross Profit/Loss = (Gross Profit) / (Gross Loss)

Percent Profitable Trades - The percent of the trades over the backtest that were profitable. Percent Profitable Trades = 100 * (Number Winning Trades) / (Number of Trades)

Number Trades - The number of trades over the backtest.

Number Winning Trades - The number of trades over the backtest that were profitable.

Number Losing Trades - The number of trades over the backtest that were not profitable.

Largest Winning Trade Profit - The most profit made by a trade during the backtest.

Largest Losing Trade Loss - The largest loss caused by a trade during the backtest.

Average Trade Profit - The average gain (or loss) across all trades in the backtest. Average Trade Profit = Net Profit / Number Trades

Average Winning Trade Profit -The average gain across all profitable trades in the backtest. Average Winning Trade Profit = (Gross Profit) / (Number Winning Trades)

Average Losing Trade Loss - The average loss across all losing trades in the backtest.

Ratio Avg Win/Avg Loss - The average winning trade profit relative to the average losing trade profit. Ratio Avg Win/Avg Loss = (Average Winning Trade Profit) / (Average Losing Trade Loss)

Maximum Consecutive Winners - The maximum number of consecutive profitable trades during the backtest.

Maximum Consecutive Losers - The maximum number of consecutive losing trades during the backtest.

Average Trade Span - The average number of bars between the entry order signal and the exit order execution for each trade in the backtest.

Average Winning Trade Span - The average number of bars between the entry order signal and the exit order execution for each profitable trade in the backtest.

Average Losing Trade Span - The average number of bars between the entry order signal and the exit order execution for each losing trade in the backtest.

Longest Trade Span - The largest number of bars between the entry order signal and the exit order execution for any single trade during the backtest.

Longest Winning Trade Span - The largest number of bars between the entry order signal and the exit order execution for any single profitable trade during the backtest.

Longest Losing Trade Span - The largest number of bars between the entry order signal and the exit order execution for any single losing trade during the backtest.

Largest Shares Traded - The largest number of shares traded during any single trade during the backtest.

Largest Winning Shares Traded - The largest number of shares traded during any single profitable trade during the backtest.

Largest Losing Shares Traded - The largest number of shares traded during any single losing trade during the backtest.

Average Shares Traded - The average number of shares traded for each trade in the backtest.

Average Winning Shares Traded - The average number of shares traded for each profitable trade in the backtest.

Average Losing Shares Traded - The average number of shares traded for each losing trade in the backtest.

Commissions Paid - The total amount of commissions paid during the backtest.

Maximum Drawdown - The maximum value of draw down, where the draw down at each bar is the difference between the highest prior closed net profit and the current open net profit. Draw down = (Largest Net Profit prior to trade entry) - (Net Profit prior to trade entry) + (Open Trade Draw down)

Maximum Open Trade Drawdown - The maximum open trade draw down for any trade during the backtest. Open Trade Draw down = (shares traded) * [(entry price) - (worst price during the trade)]. Note that the entry price incorporates any specified slippage and/or point value.

Required Account Size - If a margin per contract has been selected on the trading parameters screen, then the Required Account Size = (Maximum Draw down) + (Margin Per Contract) * (Largest Contracts Traded). If no margin per contract has been selected, then the Required Account Size is the largest entry cost where Entry Cost = (number of shares traded) * (entry price) - (Net Profit prior to trade entry). Note that the entry price incorporates any specified slippage and/or point value.

Notes:

- If missing data prevents the prediction from being made (i.e. you're using the Japanese Nikki Index as an input, but it's a Japanese Holiday, so there is no prediction made) the prediction will not generate any trading signals. Therefore, a trading system based upon the prediction will remain in the same position it was prior to the missing data. Hence, the prediction's profit statistics are based on not trading on days with missing data.

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

- (DayTrader Only) The Start Date corresponds to the date/time of the first bar in the backtest. It should be noted that a bar's time is when the bar is complete and not when the bar started.

  For example, on a 30 minute chart, the 10:00am bar contains all the price action from 9:30am to 10:00am. If the Start Date was at 10:00am, then the 10:00am bar was the first bar used for backtesting and therefore the backtest includes price action starting at 9:30am.

Topic of Interest:

What are Neural Networks?

Prediction Analysis - Trade by Trade

This screen shows the trading statistics for the selected optimal net, walk-forward net, current net, average of the walk-forwards and current net, or the out of sample results. Using this information, you can evaluate how well you have setup your prediction.

If you have chosen to display the detailed analysis of a walk-forward or an average you will be given a choice of displaying a list of the training or evaluation trade by trade results for the trades that occurred over the selected periods. To do this, select the **Show Training Statistics** option or the **Show Evaluation Statistics** option.

The following is a list of items that you will receive for each entry and exit signal in the backtest:

Date - Date on which the entry or exit was signaled.

Signal - The type of order (Long Entry, Long Exit, Short Entry, or Short Exit). On the graph, a Long Entry is annotated with a solid blue upward triangle, a Long Exit is annotated with a blue outlined downward triangle, a Short Entry is annotated with a solid red downward triangle, and a Short Exit is annotated with a red outlined upward triangle.

Shares - The number of shares (or contracts) bought or sold with the order.

Fill Date - Date on which the entry or exit was actually filled. For the simple case of a market order, the date will be the next trading day after the signal.

Price - The price at which the order was filled. On the graph, this price is annotated with an X on the Fill Date. For the simple case of a market order with no slippage the price is the open on the Fill Date. If no open is included in your data, then the previous days close is used and adjusted for gaps if a high and low is included in your data (i.e. if today's low is higher than yesterday's close then the low will be used as today's open).

Commission - The commission paid for the order. If you have not specified any entry or exit commissions in the trading parameters, this value will be zero.

%Return (exit only) - % return for the position that was exited.

> %Return is calculated as follows:
>
>> Long Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (entry price*shares – entry commissions).
>>
>> Short Percent Return = 100 * ((exit price - entry price)*shares - entry commission - exit commission) / (entry price*shares – entry commissions).
>
> If using margin $ per share/contract, then % return is calculated as follows:
>
>> Long Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (margin*contracts – entry commissions)
>>
>> Short Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (margin* contracts – entry commissions)
>
> Note that the entry and exit price incorporate any specified slippage and/or point value.

Profit/Loss (exit only) - The dollar amount made (or lost) by the position that was exited.

Cum %Ret (exit only) - The cumulative percent return for all positions up to and including the position just exited.

Cum Profit/Loss (exit only) - The cumulative profit (or loss) for all positions up to and including the position just exited.

Notes:

- If missing data prevents the prediction from being made (i.e. you're using the Japanese Nikki Index as an input, but it's a Japanese Holiday, so there is no prediction made) the prediction will not generate any trading signals. Therefore, a trading system based upon the prediction will remain in the same position it was prior to the missing data. Hence, the prediction's profit statistics are based on not trading on days with missing data.

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topic of Interest:

What are Neural Networks?

Print/Export - Setup

The Print/Export - Setup interface allows you to select the type of print/export you want to perform. Using this interface you may print to a printer (portrait or landscape), export to a file, or copy to the clipboard:

- To print to a printer (this option may not be available if you don't have a printer defined in your windows environment):
    1. Select the **Printer** option.
    2. Select if you want to print in Landscape mode or Portrait mode.

- To write to a file:
    1. Select the **File** option.
    2. Enter the name of the file that you want to write to (you may use the **Browse** button to help you).

- To copy to a clipboard:
    1. Select the **Clipboard** option.

When you have completed selecting how you want to setup your print/export select the **OK** button to execute the print/export or select the **Selection** tab to select what you want to print/export.

Print/Export - Selection (Prediction Analysis)

The Print/Export - Selection interface allows you to select what you want to print/export. Using this interface you may select exactly what you want to print/export.

The Print/Export - Selection interface will list the items that are in your prediction analysis, which are General Analysis, Trading Statistics, Trade By Trade Analysis, and Input Contribution Analysis.

Any of the items that are checked will be printed/exported and any of the items that are not checked will not be printed/exported.

When you have completed selecting what you want to print/export select the **OK** button to execute the print/export or select the **Setup** tab to select the type of print/export you want to perform.

Modifying Predictions

Modifying predictions allows you to modify the currently selected prediction. This may be useful if you want to retrain the prediction, change the criteria of a prediction (i.e. number of walk-forwards), the inputs being used, or the value the prediction is predicting.

1. Select a prediction displayed on the chart by **clicking** on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Once the prediction is selected (highlighted with black boxes), select **Modify Selected Prediction** from the **Edit** menu.
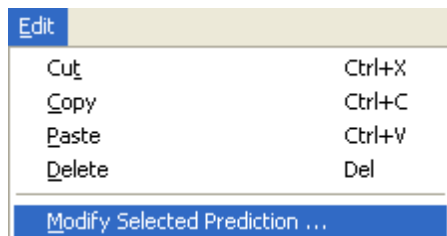
    or

1. Select a prediction displayed on the chart by **right-clicking** on the corresponding **line** or **legend text**.
2. Select **Modify Selected Prediction** from the pop-up menu.
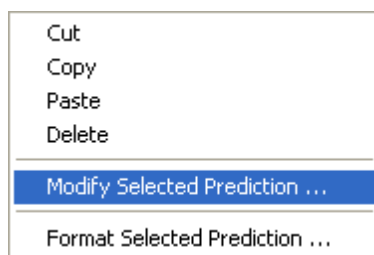
    or

1. Modify a prediction displayed on the chart by **double-clicking** on the corresponding **line** or **legend text**.

Troubleshooting:
*   You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection will not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting two data points.

Topic of Interest:
What are Neural Networks?

What are Trading Strategies?

Trading Strategies are a way of implementing a set of mechanical rules to determine when to buy and sell an instrument or a set of instruments. Trading Strategies enable you to develop a systematic approach to trading, test how a system does in the past, and use signals from the system to place trades into the future.

The NeuroShell Trader Trading Strategy Wizard makes it easy to test and implement Trading Strategies. You will be able to create strategies that do any of the following:

- Trade Long and/or short positions
- Limit losses with Trailing stops
- Trade with market, limit, stop, stop limit, and market on close orders
- Test strategies with commissions, margin, slippage and point value
- Trade a fixed number of shares/contracts, a fixed dollar amount, or a growing number of shares/contracts as profits are made.

Note:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

What are Genetic Algorithms? (Professional Only)

Genetic algorithms (GAs) seek to solve optimization problems using the methods of evolution, specifically survival of the fittest. In a typical optimization problem, there are a number of variables that control the process, and a formula or algorithm that combines the variables to fully model the process. The problem is then to find the values of the variables that optimize the model in some way. If the model is a formula, then we will usually be seeking the maximum or minimum value of the formula.

For example, if your company has $100,000 to spend on different types of advertising such as TV, radio, and print, what is the best mix of the different types that will maximize sales? The dollars spent on each type of ad are the variables that control the process. A formula would be used to calculate sales dollars. The genetic algorithm would try different combinations of dollar values for each type of advertising until it found a combination that maximizes sales (as computed by the formula). A genetic algorithm, however, does not use an exhaustive search technique; it is much faster and more efficient than that.

There are many mathematical methods which can optimize problems of this nature (and very quickly) for fairly "well behaved" problems. These traditional methods tend to break down when the problem is not so well behaved. Examples of these types of problems include combinatorial problems, or problems where the fitness function is not a smooth, continuous mathematical formula.

Evolution and Genetic Algorithms

Before describing how a genetic algorithm can be applied to an optimization problem, let us draw the evolutionary parallel. The theory is that a population of a certain species will, after many generations, adapt to live better in its environment. For example, if the species is an animal that lives mainly in a swampy area, it may eventually evolve with webbed feet. The reason is that the members of this population, which we will call individuals, will tend to die if they are poor swimmers that cannot easily get food, and tend to live and reproduce if they are good swimmers. The offspring of two good swimmers will probably be good swimmers as well because they will usually carry genetic traits of their parents, such as slight webbing between the toes. These genetic traits are carried in chromosomes in the individuals.

Plant or animal breeders often use selective breeding techniques wherein they choose parents for breeding based upon the intensity of desirable traits with which the prospective parents are endowed. These breeders are using the same evolutionary techniques.

Topics of Interest:
How Does a Genetic Algorithm Work? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
What Types of Problems Do Genetic Algorithms Solve? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

How Does a Genetic Algorithm Work? (Professional Only)

A genetic algorithm solves optimization problems by creating a population or group of possible solutions to the problem. The individuals in this population will carry chromosomes that are the values of variables of the problem.

The genetic algorithm actually solves your problem by allowing the less fit individuals in the population to die (peacefully) and selectively breeding the most fit individuals (the ones that solve the problem best). This process is called selection, as in selection of the fittest. The genetic algorithm will take two fit individuals and mate them (a process called crossover). The offspring of the mated pair will receive some of the characteristics of the mother, and some of the father.

In nature, offspring often have some slight abnormalities, called mutations. Usually these mutations are disabling and inhibit the ability of the children to survive, but once in a while they improve the fitness of the individual (like toes stuck together in a web-like fashion). The genetic algorithm similarly occasionally causes mutations in its populations by randomly changing the value of a variable.

After the genetic algorithm mates fit individuals and mutates some, the population undergoes a generation change. The population will then consist of offspring plus a few of the older individuals, which the genetic algorithm allows to survive to the next generation because they are the most fit in the population, and we will want to keep them breeding. These most fit individuals are called elite individuals.

After dozens or even hundreds of "generations", a population eventually emerges wherein the individuals will solve the problem very well. In fact, the most fit (elite) individual will be an optimum or close to optimum solution.

The processes of selection, crossover, and mutation are called genetic operators.

Topics of Interest:

Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)

There are many opportunities for optimization in technical analysis. Prior to the NeuroShell Trader Professional, some trading systems had optimizers, but the optimization technique used was simple "exhaustive search", meaning that every possible combination was tried to see what was the best one. This is a very accurate approach, since you are bound to find the best combination of variables - eventually. However, it is a very inefficient approach, because whenever there are more than a few thousand combinations, it takes too long to try them all. That is why users of exhaustive search optimizers tend to limit the number of variables they use, or tend to limit the number of values these variables can take.

The genetic algorithm, by contrast, does not try every possible combination. It attempts instead to intelligently get closer and closer to the best solution. Therefore, far more variables can be utilized, and you can allow all values of a variable. Optimization can still take a good deal of time if you give a GA a fair number of variables, but it will be doing much more work in that amount of time.

More efficient optimizers than exhaustive search optimizers are in use. If they are not genetic algorithms, however, they are most likely only searching one section of the search space at a time. Genetic algorithms are searching dozens or hundreds of parts of the search space simultaneously. This means they are impervious to becoming stuck in "local minima" as the others quite often do. (Local minima are decent solutions that the optimizer can never get out of in order to find better solutions.)

Topics of Interest:

What are Genetic Algorithms? (Professional Only)

How Does a Genetic Algorithm Work? (Professional Only)

What Types of Problems Do Genetic Algorithms Solve? (Professional Only)

How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

What Types of Problems Do Genetic Algorithms Solve? (Professional Only)

A genetic algorithm is a computational method modeled on biological evolutionary processes that can be used to find the optimum solution to a problem that may have many solutions. For example, you can use genetic algorithms to find the maximum and the minimum of a function, to find an optimal route on a map, or to minimize the cost of manufacturing your products. They can be used to find an optimal set of parameters (such as the optimal number of shares of each type of stock in a portfolio), or to select an optimal sequence of events (such as the shortest route to cover a sales territory). In other words, genetic algorithms can be powerful tools for finding the best of millions of possible solutions for different real life problems.

These algorithms have been found to be very powerful in solving optimization problems that appear to be difficult or even unsolvable by traditional methods. Genetic algorithms use a minimum of information about the problem and they only require a quantitative estimation of the quality of a possible solution. This makes them easy to use and applicable to most optimization problems.

Genetic Algorithm Applications

The following is a list of some of the applications developed by Ward Systems Group customers. Business applications for genetic algorithms include:

Business
Optimizing process control operations
Scheduling salesman or delivery routes
Minimizing manufacturing time
Optimizing budget allocations to different departments to maximize profit
Optimizing retail site locations
Group packages with different dimensions into delivery lots

Finance
Generating rules to predict a rise in stock indexes
Optimally group stocks with different values into balanced portfolios
Minimize financial risk managing a fund while simultaneously trying to maximize return
Optimize technical indicators
Finding optimal trading strategies

Medicine
Optimize treatment programs
Schedule use of medical treatment practitioners and/or facilities
Classify patients into groups for experimental studies
Schedule medical students through training and clinical rotations

Science
Maximize polymer qualities based upon different composition materials
Optimize chemical reactions based on different chemicals or processing times
Maximize forest yield by varying types of trees planted, fertilization, and cutting practices

And many more!

Topics of Interest:
What are Genetic Algorithms? (Professional Only)
How Does a Genetic Algorithm Work? (Professional Only)
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How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

In the Prediction Wizard, genetic algorithms are used to find:

1. The best inputs to a neural network
2. The best parameters for indicators used as inputs to a neural network
3. The best buy/sell thresholds for neural nets

In the Trading Strategy Wizard, genetic algorithms are used to find:

1. The best trading rules to use
2. The best parameters for indicators used in trading rules
3. The best parameters for indicators used in limit orders, stop orders, and stop limit orders

In order for a genetic algorithm to optimize, it has to have an idea of what fit individuals in the population look like (the fitness function). The fitness function is the Training Objective in the Prediction Wizard, and the Objective in the Trading Strategy Wizard. You will find that these are objectives like "minimize error", "maximize correlation", "minimize drawdown", "maximize net profit", etc. To a very great extent, your choice of the objective (fitness) function can have a great bearing on how well the optimization goes, and how well the optimized model works later on out of sample data. Unfortunately, there are no universal guidelines.

Topics of Interest:

What are Genetic Algorithms? (Professional Only)

How Does a Genetic Algorithm Work? (Professional Only)

Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)

What Types of Problems Do Genetic Algorithms Solve? (Professional Only)

Creating a Trading Strategy

Creating a trading strategy will allow you to add buy/sell signals to your chart that are based upon rules that you define.

1. Select **New Trading Strategy** from the **Insert** menu. This activates the trading strategy wizard, which guides you through the process of creating a trading strategy.
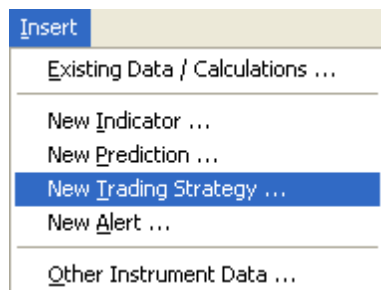
Notes:

- You can have multiple trading strategies displayed on a chart by simply creating more than one trading strategy.
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topic of Interest:

What are Trading Strategies?

Trading Strategy Wizard - Templates

This screen show s the trading strategy templates available for use. Trading strategy templates are preconfigured trading strategies that allow you to create a trading strategy quickly w ithout having to know or w orry about all the details of creating one from scratch.

To select an existing trading strategy template:
1.   Select the desired template from the list.

To create a trading strategy from scratch
1.   Select (No Template) located at the top of the list.

When you are satisfied w ith the template the trading strategy w ill use press the **Next** button to proceed to the next w izard screen.

Note:
*   It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topic of Interest:
What are Trading Strategies?

Trading Strategy Wizard - Long Entry

The Long Entry tab allows you to specify your entry conditions to a long position.

If you don't want to trade long in this trading strategy, then deselect "Generate a buy long order …". This will allow you to continue without entering any entry conditions, trailing stops, or exit conditions for a long position.

For more information about the different types of trading strategies see Trading Strategy Types.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters (Professional Only) or the indicator's parameter ranges.

If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or the indicator's parameter ranges.

- To insert long entry conditions:
    1. Press the **Add Condition(s)** button.

- To modify a long entry condition, long entry condition's parameter, (Professional Only) or long entry condition's parameter range:
    1. Select the item in the list you wish to modify.
    2. Press the **Modify Condition** button or **Modify Parameter** button (depending on what item you have selected).
    Or
    1. By **double-clicking** on the item in the list you wish to modify.

- To remove a long entry condition:
    1. Select the entry condition(s) in the list you wish to remove.
    2. Press the **Remove Condition(s)** button or press the **delete** button on you keyboard.

The Order Type, Number of Conditions, Short Trading, and Trailing Stop interfaces described below may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

Select the <Order Type> that you want to use when entering a long position:

Market Order - Enters at the opening of the next bar. The entry price is the opening price plus slippage.

Stop Order - Enters if the next bar trades at or above the stop price. The entry price is the stop price (or open price if the bar opens above the stop price) plus slippage.

Limit Order - Enters if the next bar trades at or below the limit price. The entry price is the limit price (or open price if the bar opens below the stop price).

Stop Limit Order - Enters the market if the next bar trades above the stop price and then subsequently trades at or below the limit price. The final entry price is the limit price.

Market Close Order - Enters at the closing of the next bar. The entry price is the closing price plus slippage.

If you select a stop order, limit order or stop limit order be sure to enter the corresponding stop price and/or limit price. Note that the stop, limit, and stop limit orders are day orders and are therefore canceled if not filled by the end of the next bar. If you want to trade from the open to the close of a single bar, use a market order to enter at the open of the next bar and a market close order with the same conditions to exit at the close.

Select the <Number of Conditions> that you want to be true for a long entry signal to be generated. As an example, if you have three items listed and you have selected the <Number of Conditions> to be 2, then when any 2 of the three entry conditions are true a long entry signal will be generated.

When displayed on a chart, a Long Entry is annotated with a solid blue upward triangle below the bar on which the long entry signal was generated. The entry price is annotated on the next bar with a blue X. When using stop, limit and stop limit orders, no entry price annotation will appear on the next bar if the order is not filled and you will likely see a series of entry signal annotations for subsequent bars until an order is filled.

If you are using a stop price, then the stop price is displayed on the chart as a horizontal blue line placed at the stop price level and extending from just after the bar on which it was calculated to the next bar for which it is active. If you are using a limit price, then the limit price is displayed on the chart as a horizontal dashed blue line placed at the limit price level and extending from just after the bar on which it was calculated to the next bar for which it is active.

After setting your long entry conditions, <Order Type>, and <Number of Conditions> you can select the **Long Trailing Stop** tab, **Long Exit** tab, **Short Entry** tab, **Short Trailing Stop** tab, **Short Exit** tab or the **Next** button.

Note:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- (Professional Only) When using Full Optimization or Rule Selection, the trading strategy allow s reduction in the number of conditions below the number specified that must be true w hen a better solution if found w ith few er rules. When the number of conditions selected by the optimizer is less than the specified number that must be true, all the optimally selected rules must be true for the entry to occur.

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Trading Strategy Wizard - Long Trailing Stop

The Long Trailing Stop tab allow s you to specify trailing stop price levels for a long position. Note that a trailing stop liquidates a position w ith a stop order placed prior to and executed during the bar in w hich the stop price w as penetrated. In contrast, exit conditions liquidate a position w ith an exit order placed and executed after the bar on w hich the exit condition(s) became true.

If you don't w ant to use a long trailing stop in this trading strategy, then deselect "Generate a trailing stop order for every bar that is after an entry order has been filled and before an exit order has been generated". This w ill allow you to continue w ithout entering any trailing stop price levels for a long position. Note that if you deselect both long trailing stop and long exit conditions, then a long position w ill end (w ith a market order to exit long) w henever a short entry signal occurs.

For more information about the different types of trading strategies see Trading Strategy Types.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters (Professional Only) or the indicator's parameter ranges.
If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or the indicator's parameter ranges.

- To insert long trailing stop price levels:
    1. Press the **Add price level(s)** button.

- To modify a long trailing stop price level, long trailing stop price level's parameter, (Professional Only) or long trailing stop price level's parameter range:
    1. Select the item in the list you w ish to modify.
    2. Press the **Modify price level** button or **Modify Parameter** button (depending on w hat item you have selected).
    Or
    1. By **double-clicking** on the item in the list you w ish to modify.

- To remove a long trailing stop price level:
    1. Select the price level(s) in the list you w ish to remove.
    2. Press the **Remove price level(s)** button or press the **delete** button on you keyboard.

When displayed on a chart, a long trailing stop is displayed as a horizontal blue line placed at the most recent trailing stop price level and extending from just after the bar on w hich it w as calculated to the next bar for w hich it is active. If the trailing stop price level is reached during the next bar, the exit price is annotated on the next bar w ith a blue X. The exit price is the trailing stop price (or open price if the bar opens below the trailing stop price) minus slippage.

The Short Trading interfaces described below may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

After setting your long trailing stop price levels you can select the **Long Entry** tab, **Long Exit** tab, **Short Entry** tab, **Short Trailing Stop** tab, **Short Exit** tab or the **Next** button.

Notes:
- If you are using both trailing stops and exit conditions, the trailing stop w ill not be placed on days w here the exit condition is true and the exit order type is a Market Order.
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

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Trading Strategy Wizard - Long Exit

The Long Exit tab allow s you to specify exit conditions for a long position. Note that exit conditions liquidate a position w ith an exit order placed and executed after the bar on w hich the exit condition(s) became true. In contrast, a trailing stop liquidates a position w ith a stop order placed prior to and executed during the bar in w hich the stop price w as penetrated.

If you don't w ant to use long exit conditions in this trading strategy, then deselect the "Generate a sell long order …". This w ill allow you to continue w ithout entering any exit conditions for a long position. Note that if you deselect both long trailing stop and long exit conditions, then a long position w ill end (w ith a market order to exit long) w henever a short entry signal occurs.

For more information about the different types of trading strategies see Trading Strategy Types.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters (Professional Only) or the indicator's parameter ranges.

If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or the indicator's parameter ranges.

- To insert long exit conditions:
    1. Press the **Add Condition(s)** button.

- To modify a long exit condition, long exit condition's parameter, (Professional Only) or long exit condition's parameter range:
    1. Select the item in the list you w ish to modify.
    2. Press the **Modify Condition** button or **Modify Parameter** button (depending on w hat item you have selected).
    Or
    1. By **double-clicking** on the item in the list you w ish to modify.

- To remove a long exit condition:
    1. Select the exit condition(s) in the list you w ish to remove.
    2. Press the **Remove Condition(s)** button or press the **delete** button on you keyboard.

The Order Type, Number of Conditions, Short Trading, and Trailing Stop interfaces described below may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

Select the <Order Type> that you w ant to use w hen exiting a long position:

Market Order - Exits at the opening of the next bar. The exit price is the opening price minus slippage.

Stop Order - Exits if the next bar trades at or below the stop price. The exit price is the stop price (or open price if the bar opens below the stop price) minus slippage.

Limit Order - Exits if the next bar trades at or above the limit price. The exit price is the limit price (or open price if the bar opens above the stop price).

Stop Limit Order - Exits if the next bar trades below the stop price and then subsequently trades at or above the limit price. The final exit price is the limit price.

Market Close Order - Exits at the closing of the next bar. The exit price is the closing price minus slippage.

If you select a stop order, limit order or stop limit order be sure to enter the corresponding stop price and/or limit price. Note that the stop, limit, and stop limit orders are day orders and are therefore canceled if not filled by the end of the next bar. If you w ant to trade from the open to the close of a single bar, use a market order to enter at the open of the next bar and a market close order w ith the same conditions to exit at the close.

Select the <Number of Conditions> that you w ant to be true for a long exit signal to be generated. As an example, if you have three conditions listed and you have selected the <Number of Conditions> to be 2, then w hen any 2 of the three exit conditions are true a long exit signal w ill be generated.

When displayed on a chart, Long Exit is annotated w ith a blue outlined dow nw ard triangle above the bar on w hich the long exit signal w as generated. The exit price is annotated on the next bar w ith a blue X. When using stop, limit and stop limit orders, no exit price annotation w ill appear on the next bar if the order is not filled and you w ill likely see a series of exit signal annotations for subsequent bars until an order is filled.

If you are using a stop price, then the stop price is displayed on the chart as a horizontal blue line placed at the stop price level

and extending from just after the bar on which it was calculated to the next bar for which it is active. If you are using a limit price, then the limit price is displayed on the chart as a horizontal dashed blue line placed at the limit price level and extending from just after the bar on which it was calculated to the next bar for which it is active.

After setting your long exit conditions, <Order Type>, and <Number of Conditions> you can select the **Long Entry** tab, **Long Trailing Stop** tab, **Short Entry** tab, **Short Trailing Stop** tab, **Short Exit** tab or the **Next** button.

Notes:
- If you are using both trailing stops and exit conditions, the trailing stop will not be placed on days where the exit condition is true and the exit order type is a Market Order.
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- (Professional Only) When using Full Optimization or Rule Selection, the trading strategy allows reduction in the number of conditions below the number specified that must be true when a better solution if found with fewer rules. When the number of conditions selected by the optimizer is less than the specified number that must be true, all the optimally selected rules must be true for the exit to occur.

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Trading Strategy Wizard - Short Entry

The Short Entry tab allows you to specify your entry conditions to a short position.

If you don't want to trade short in this trading strategy, then deselect "Generate a sell short order …". This will allow you to continue without entering any entry conditions, trailing stops, or exit conditions for a short position.

For more information about the different types of trading strategies see Trading Strategy Types.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters (Professional Only) or the indicator's parameter ranges.
If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or the indicator's parameter ranges.

- To insert short entry conditions:
    1. Press the **Add Condition(s)** button.

- To modify a short entry condition, short entry condition's parameter, (Professional Only) or short entry condition's parameter range:
    1. Select the item in the list you wish to modify.
    2. Press the **Modify Condition** button or **Modify Parameter** button (depending on what item you have selected).
    Or
    1. By **double-clicking** on the item in the list you wish to modify.

- To remove a short entry condition:
    1. Select the entry condition(s) in the list you wish to remove.
    2. Press the **Remove Condition(s)** button or press the **delete** button on you keyboard.

The Order Type, Number of Conditions and Trailing Stop interfaces described below may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

Select the <Order Type> that you want to use when entering a short position:
Market Order - Enters at the opening of the next bar. The entry price is the opening price minus slippage.
Stop Order - Enters if the next bar trades at or below the stop price. The entry price is the stop price (or open price if the bar opens below the stop price) minus slippage.
Limit Order - Enters if the next bar trades at or above the limit price. The entry price is the limit price (or open price if the bar opens above the stop price).
Stop Limit Order - Enters if the next bar trades below the stop price and then subsequently trades at or above the limit price. The final entry price is the limit price.
Market Close Order - Enters at the closing of the next bar. The entry price is the closing price minus slippage.

If you select a stop order, limit order or stop limit order be sure to enter the corresponding stop price and/or limit price. Note that the stop, limit, and stop limit orders are day orders and are therefore canceled if not filled by the end of the next bar. If you want to trade from the open to the close of a single bar, use a market order to enter at the open of the next bar and a market close order with the same conditions to exit at the close.

Select the <Number of Conditions> that you want to be true for a short entry signal to be generated. As an example, if you have three conditions listed and you have selected the <Number of Conditions> to be 2, then when any 2 of the three entry conditions are true a short entry signal will be generated.

When displayed on a chart, a Short Entry is annotated with a solid red downward triangle above the bar on which the short entry signal was generated. The entry price is annotated on the next bar with a red X. When using stop, limit and stop limit orders, no entry price annotation will appear on the next bar if the order is not filled and you will likely see a series of entry signal annotations for subsequent bars until an order is filled.

If you are using a stop price, then the stop price is displayed on the chart as a horizontal red line placed at the stop price level and extending from just after the bar on which it was calculated to the next bar for which it is active. If you are using a limit price, then the limit price is displayed on the chart as a horizontal dashed red line placed at the limit price level and extending from just after the bar on which it was calculated to the next bar for which it is active.

After setting your short entry conditions, <Order Type>, and <Number of Conditions> you can select the **Long Entry** tab, **Long Trailing Stop** tab, **Long Exit** tab, **Short Trailing Stop** tab, **Short Exit** tab, or the **Next** button.

Note:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- (Professional Only) When using Full Optimization or Rule Selection, the trading strategy allows reduction in the number of conditions below the number specified that must be true when a better solution if found with fewer rules. When the number of conditions selected by the optimizer is less than the specified number that must be true, all the optimally selected rules must be true for the entry to occur.

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Trading Strategy Wizard - Short Trailing Stop

The Short Trailing Stop tab allow s you to specify trailing stop price levels for a short position. Note that a trailing stop liquidates a position w ith a stop order placed prior to and executed during the bar in w hich the stop price w as penetrated. In contrast, exit conditions liquidate a position w ith an exit order placed and executed after the bar on w hich the exit condition(s) became true.

If you don't w ant use a short trailing stop in this trading strategy, then deselect "Generate a trailing stop order for every bar that is after an entry order has been filled and before an exit order has been generated". This w ill allow you to continue w ithout entering any trailing stop price levels for a short position. Note that if you deselect both short trailing stop and short exit conditions, then a short position w ill end (w ith a market order to exit short) w henever a long entry signal occurs.

For more information about the different types of trading strategies see Trading Strategy Types.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters (Professional Only) or the indicator's parameter ranges.
If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or the indicator's parameter ranges.

- To insert short trailing stop price levels:
    1. Press the **Add price level(s)** button.

- To modify a short trailing stop price level, short trailing stop price level's parameter, (Professional Only) or short trailing stop price level's parameter range:
    1. Select the item in the list you w ish to modify.
    2. Press the **Modify price level** button or **Modify Parameter** button (depending on w hat item you have selected).
    Or
    1. By **double-clicking** on the item in the list you w ish to modify.

- To remove a short trailing stop price level:
    1. Select the price level(s) in the list you w ish to remove.
    2. Press the **Remove price level(s)** button or press the **delete** button on you keyboard.

When displayed on a chart, a short trailing stop is displayed as a horizontal red line placed at the most recent trailing stop price level and extending from just after the bar on w hich it w as calculated to the next bar for w hich it is active. If the trailing stop price level is reached during the next bar, the exit price is annotated on the next bar w ith a red X. The exit price is the trailing stop price (or open price if the bar opens above the trailing stop price) plus slippage.

After setting your short trailing stop price levels you can select the **Long Entry** tab, **Long Trailing Stop** tab, **Long Exit** tab, **Short Entry** tab, **Short Exit** tab, or the **Next** button.

Notes:
- If you are using both trailing stops and exit conditions, the trailing stop w ill not be placed on days w here the exit condition is true and the exit order type is a Market Order.
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topics of Interest:
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Trading Strategy Wizard - Short Exit

The Short Exit tab allow s you to specify exit conditions for a short position. Note exit conditions liquidate a position w ith an exit order placed and executed after the bar on w hich the exit condition(s) became true. In contrast, a trailing stop liquidates a position w ith a stop order placed prior to and executed during the bar in w hich the stop price w as penetrated.

If you don't w ant to use short exit conditions in this trading strategy, then deselect "Generate a cover short order …". This w ill allow you to continue w ithout entering any exit conditions for a short position. Note that if you deselect both short trailing stop and short exit conditions, then a short position w ill end (w ith a market order to exit short) w henever a long entry signal occurs.

For more information about the different types of trading strategies see Trading Strategy Types.

If an indicator has a + sign to the left of the indicator you may click on the + sign to show the indicator's parameters (Professional Only) or the indicator's parameter ranges.

If an indicator has a – sign to the left of the indicator you may click on the – sign to hide the indicator's parameters (Professional Only) or the indicator's parameter ranges.

- To insert short exit conditions:
    1. Press the **Add Condition(s)** button.

- To modify a short exit condition, short exit condition's parameter, (Professional Only) or short exit condition's parameter range:
    1. Select the item in the list you w ish to modify.
    2. Press the **Modify Condition** button or **Modify Parameter** button (depending on w hat item you have selected).
    Or
    1. By **double-clicking** on the item in the list you w ish to modify.

- To remove a short exit condition:
    1. Select the exit condition(s) in the list you w ish to remove.
    2. Press the **Remove Condition(s)** button or press the **delete** button on you keyboard.

The Order Type, Number of Conditions and Trailing Stop interfaces described below may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

Select the <Order Type> that you w ant to use w hen exiting a short position:

Market Order - Exits at the opening of the next bar. The exit price is the opening price plus slippage.

Stop Order - Exits if the next bar trades at or above the stop price. The exit price is the stop price (or open price if the bar opens above the stop price) plus slippage.

Limit Order - Exits if the next bar trades at or below the limit price. The exit price is the limit price (or open price if the bar opens below the stop price).

Stop Limit Order - Exits the market if the next bar trades above the stop price and then subsequently trades at or below the limit price. The final exit price is the limit price.

Market Close Order - Exits at the closing of the next bar. The exit price is the closing price plus slippage.

If you select a stop order, limit order or stop limit order be sure to enter the corresponding stop price and/or limit price. Note that the stop, limit, and stop limit orders are day orders and are therefore canceled if not filled by the end of the next bar. If you w ant to trade from the open to the close of a single bar, use a market order to enter at the open of the next bar and a market close order w ith the same conditions to exit at the close.

Select the <Number of Conditions> that you w ant to be true for a short exit signal to be generated. As an example, if you have three conditions listed and you have selected the <Number of Conditions> to be 2, then w hen any 2 of the three exit conditions are true a short exit signal w ill be generated.

When displayed on a chart, a Short Exit is annotated w ith a red outlined upw ard triangle below the bar on w hich the short exit signal w as generated. The exit price is annotated on the next bar w ith a red X. When using stop, limit and stop limit orders, no exit price annotation w ill appear on the next bar if the order is not filled and you w ill likely see a series of exit signal annotations for subsequent bars until an order is filled.

If you are using a stop price, then the stop price is displayed on the chart as a horizontal red line placed at the stop price level

and extending from just after the bar on w hich it w as calculated to the next bar for w hich it is active. If you are using a limit price, then the limit price is displayed on the chart as a horizontal dashed red line placed at the limit price level and extending from just after the bar on w hich it w as calculated to the next bar for w hich it is active.

After setting your short exit conditions, <Order Type>, and <Number of Conditions> you can select the **Long Entry** tab, **Long Trailing Stop** tab, **Long Exit** tab, **Short Entry** tab, **Short Trailing Stop** tab, or the **Next** button.

Notes:
- If you are using both trailing stops and exit conditions, the trailing stop w ill not be placed on days w here the exit condition is true and the exit order type is a Market Order.
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- (Professional Only) When using Full Optimization or Rule Selection, the trading strategy allow s reduction in the number of conditions below the number specified that must be true w hen a better solution if found w ith few er rules. When the number of conditions selected by the optimizer is less than the specified number that must be true, all the optimally selected rules must be true for the exit to occur.

Topics of Interest:
What are Trading Strategies?
Using Predictions
Trading Strategy Types

Trading Strategy Wizard - Parameters

This screen show s the parameters the trading strategy w ill use w hen calculating trading strategy performance. Among other things, the trading strategy parameters are used to determine the start of trading strategy and evaluation of trading strategy performance, the size of trades, entry commission(s), exit commission(s), and other costs associated w ith each trade.

This screen may or may not be displayed depending upon the currently selected Trading Strategy Wizard Interface Options. If displayed, the list w ill show only the parameters w hose interface options have been selected. All other parameters are set to their default values and do not appear in the list w hen the corresponding interface option has not been selected. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

If you w ish to change any of these parameters:

1.   Press the **Modify Training Strategy Parameters** button.

When you are satisfied w ith the trading strategy parameters press the **Next** button to proceed to the next w izard screen.

Notes:

- If you are trying to match the trading points of a prediction use the **Match date ranges to the out of sample date ranges of prediction(s) used in the trading strategy** option on the Trading tab after you select to **Modify Trading Strategy Parameters**. This option w ill automatically match up the dates to your out of sample prediction(s) so that all of the trading strategy results w ill be based on data that the prediction(s) w asn't trained on.
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topic of Interest:

What are Trading Strategies?

Trading Strategy Wizard - Results Summary

This screen show s the results of your trading strategy after the calculations are finished computing.

If at any time during backtest calculations, you w ant to abort, press the **Abort** button. After backtesting has been aborted, you may do any of the follow ing:

- Press the **Rebacktest** button to restart the backtesting.
- Press the **Back** button to modify the trading strategy.
- Press the **Cancel** button to exit the trading strategy w izard w ithout saving any results.
- Press the minimize icon at the top right corner of the w izard to minimize the entire NeuroShell Trader application.   Doing so w ill allow you to w ork w ith other programs during backtesting. Note that using the **Show Desktop** Window s task bar icon, typically located next to the Window s **Start** button, w ill also minimize the NeuroShell Trader application.

(DayTrader Only) During market hours, optimization and backtesting may be much slow er if processor time is being utilized to update charts w ith real-time data. Use the "Don't update chart w hile optimizing/backtesting" check box to turn off the real-time updating chart during optimization/backtesting.

After all backtest calculations have finished, you may do any of the follow ing:

- Sort the results list by clicking on the column header by w hich the list should be sorted. Clicking once w ill sort the list in ascending order based upon the values in that column. Clicking a column header a second time w ill sort the list in descending order based upon the values in that column.
- Press the **Rebacktest** button to restart the backtesting.
    (Professional Only) If you are optimizing, you w ill be given the choice to optimize starting at the last optimal settings, reoptimize starting from scratch, or simply rebacktest w ith the last optimal settings (no optimization occurs).
- Press the **Finished** button to end the w izard and add the trading strategy to your chart
- Press the **Back** button to modify the trading strategy.
- Press the **Cancel** button to exit the trading strategy w izard w ithout saving any results.
- Press the **Detailed Analysis** button to view detailed analysis of the selected trading strategy.
- Press the **Save as Template** button to save the trading strategy as a new trading strategy template. Saving the trading strategy as a template allow s you to apply the same trading strategy to different charts w ithout having to recreate the analysis from scratch.
- Press the **Print** button to print a copy of the trading strategy.

The columns and statistics that are displayed can be customized in the **Results Screen Columns** section of the Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

Notes:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- NeuroShell Trader defaults to displaying an annualized percent return in the results summary (unless you changed the optimization objective function). If you are using a small backtest period, keep in mind that the percentage show n is an annualized return. For instance, if the NeuroShell Trader displays an annualized return of 1000% across a one w eek backtest, the actual return w as approximately 20% for the w eek. (DayTrader Only) In the NeuroShell DayTrader, the difference becomes even greater. For example, a 1000% annualized return across a one day backtest is approximately a 4% return for the day.
- (DayTrader Only) The Start Date corresponds to the date/time of the first bar in the backtest. It should be noted that a bar's time is w hen the bar is complete and not w hen the bar started.
    For example, on a 30 minute chart, the 10:00am bar contains all the price action from 9:30am to 10:00am. If the Start Date w as at 10:00am, then the 10:00am bar w as the first bar used for backtesting and therefore the backtest includes price action starting at 9:30am.
- Trading Strategies play sound files or show pop-up order messages (for example: Buy 100 Shares of Dell) w hen a new order is generated. Only active trading strategies w ill play sound files or show pop-up order messages.
    When a new Trading Strategy is added to a chart, it is automatically activated. To deactivate or reactivate a trading strategy, select the **Alerts and Orders Window** menu item from the **View** menu.
    To change the sound and pop-up message options, select the **Options** menu item from the **Tools** Menu. If the **Play Sound File** option is selected, then the selected sound w ill play w henever an active trading strategy generates a trading order. If the **Popup Order Message** option is selected, a pop-up order notification message w ill appear w henever an active trading strategy generates a trading order.

Topic of Interest:

What are Trading Strategies?
Trading Objective Functions

Print/Export - Setup

The Print/Export - Setup interface allows you to select the type of print/export you want to perform. Using this interface you may print to a printer (portrait or landscape), export to a file, or copy to the clipboard:

- To print to a printer (this option may not be available if you don't have a printer defined in your windows environment):
    1. Select the **Printer** option.
    2. Select if you want to print in Landscape mode or Portrait mode.

- To write to a file:
    1. Select the **File** option.
    2. Enter the name of the file that you want to write to (you may use the **Browse** button to help you).

- To copy to a clipboard:
    1. Select the **Clipboard** option.

When you have completed selecting how you want to setup your print/export select the **OK** button to execute the print/export or select the **Selection** tab to select what you want to print/export.

Print/Export - Selection (Trading Strategy)

The Print/Export - Selection interface allow s you to select w hat you w ant to print/export. Using this interface you may select exactly w hat you w ant to print/export.

The Print/Export - Selection interface w ill list the items that are in your trading strategy. The possible items in this list are (Professional Only) Optimization, Long Entry, Long Trailing Stop, Long Exit, Short Entry, Short Trailing Stop, Short Exit, Trading Strategy Parameters, and Trading Strategy Results Summary.

Any of the items that are checked w ill be printed/exported and any of the items that are not checked w ill not be printed/exported.

When you have completed selecting w hat you w ant to print/export select the **OK** button to execute the print/export or select the **Setup** tab to select the type of print/export you w ant to perform.

Trading Strategy Parameters - Rules (Professional Only)

Use the trading strategy parameters rules tab to select the type of optimization you w ant to perform.

The parameters on this tab may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

1.   Select the **optimization method used to determine the best entry, stop, and exit rules for the trading strategy**.

   Full Optimization - Performs both **Parameter Search** and **Rule Selection** at the same time.

   Parameter Search - All of your conditions (rules) are used, but the GA evolves optimum parameters for you. These parameters do not produce rules that are individually optimum, but optimal as a complete set.

   Rule Selection - Chooses among all the rules you have specified, leaving you w ith only the ones that w ork best together.

   No Optimization - Trades using the user specified rules. Performs no modifications to any rules or rule parameters.

Note:
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topics of Interest:
What are Trading Strategies?
What are Genetic Algorithms? (Professional Only)
How Does a Genetic Algorithm Work? (Professional Only)
Why is a Genetic Algorithm Better Than Other Optimizers? (Professional Only)
What Types of Problems Do Genetic Algorithms Solve? (Professional Only)
How are Genetic Algorithms Used in the NeuroShell Trader Professional? (Professional Only)

Trading Strategy Parameters - Trading

Use the trading strategy parameters general tab to set up size of trades and other trading parameters used to evaluate the trading strategy.

The parameters on this tab may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

1. Specify the **Size of trades used to evaluate trading strategy**. The size of trades is important because it is the basis for profit and commission calculations during the backtest. For the profit and commission statistics to be realistic, you should specify a trading size that is closest to your actual trading style.

   Buy a fixed number of shares - Backtests trading the specified number of shares

   Buy a fixed dollar amount of shares - Backtests trading a varying number of shares based upon the specified dollar amount and the closing price when the entry signal occurs. Shares Traded = (Dollars Specified / Entry Price) rounded down to the nearest whole number of shares.

   Buy as many shares as possible with current account balance - Backtests trading a varying number of shares based upon the current account balance and the closing price when the entry signal occurs. The current account balance is increased/decreased by the realized profit/loss of each trade. Shares Traded = (Current Account Balance / Entry Price) rounded down to the nearest whole number of shares.

2. Specify the **Other Trading Parameters** used to evaluate trading strategy.

   Buy shares in round lot of – Rounds down the number of shares traded to a multiple of the specified number of shares. As an example, if the round lot shares is set to 100 and the number of shares to be traded is 299, then the actual number of shares traded will be 200.

   Long/Short entries exit existing short/long positions – Forces an entry signal to automatically exit existing positions. Long positions will be exited when the short entry condition(s) become true. Likewise, short positions will be exited when the long entry condition(s) become true. If you do not select this parameter and you have specified trailing stops and/or exit conditions, then a position will be exited only when the trailing stops are hit or the exit conditions become true.

   Match date ranges to the out of sample date ranges of prediction(s) used in the trading strategy (this option is only available if you are using a prediction in your trading strategy) - This option matches up the dates of the out of sample period of the prediction(s) to the period that you are evaluating your trading strategy over. (Professional Only) Additionally, this option matches up the periods that the prediction(s) has been optimized over to the period that the trading strategy will be optimized over.

When you are satisfied with the Trading Strategy Parameters press the **OK** button to return to the Trading Strategy Wizard.

Topic of Interest:
What are Trading Strategies?

Trading Strategy Parameters - Dates

Use the trading strategy parameters dates tab to set up the data ranges for the trading strategy paper trading (Professional Only) and optimization.

The parameters on this tab may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

1.   Specify the **Data used to evaluate trading strategy**.

You can specify that the data range(s) match the chart, be a specified size, or start and stop on specified dates.

2.   (Professional Only) Specify whether or not to **Save optimization which performs best on later paper trading**.

If you choose **Save optimization which performs best on later paper trading**, the model's parameters are still optimized on the optimization set, but each new optimal solution that is found by the GA is applied to the paper trading set. If that optimal solution is found to get better results on the paper trading set than previous optimal solutions, then it is saved as the 'best model'. Optimal solutions that underperformed on the paper trading are still used in the GA optimization process to find an optimal solution on the optimal data set, but they are not used as the 'best model'.   The final model selected by the optimization is the last saved 'best model'.

3.   Specify whether or not to **Start trading before last chart date**.

This option may or may not be visible depending upon the currently selected NeuroShell Trader program options. To enable this option, from the main NeuroShell Trader menu, select **Tools**, choose **Options**, navigate to the **Advanced** option tab and check **Allow real trading to begin before last chart date** under the **Date interface settings**.

The **Start trading before last chart date** option allows a 'trading' statistics data set to be calculated after the optimization and paper trading data sets. This 'trading' data set will be a true "out-of-sample" data set. It can be used if you do not wish to keep the model that did best on paper trading, but yet you still want to see how a model did on data other than the optimization data set. This data set can also be used in conjunction with saving the model that did best on subsequent paper trading to evaluate the model and yet another independent data set.

When you are satisfied with the Trading Strategy Parameters press the **OK** button to return to the Trading Strategy Wizard.

(Professional Only) Note that the optimization range of data is important because it determines which trading strategy is the "best" (as specified by your Optimization objective on the Optimization tab). The default is to optimize across the same data as the paper trading data, as this seems to be the standard among our competitors. This is a little risky, because we are really looking at in sample results. On the other hand, the NeuroShell Trader Professional is, we believe, the first software to optimize trading strategies that actually offers an alternative. In other words, we are the first to provide a paper trading data set that is out of sample from the optimization data set. Therefore, you might want to take some risk here since it has been standard practice for some time. If you do not want to take that risk, simply do not choose the **Save optimization which performs best on later paper trading option**.

Notes:
- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- The start date for the trading strategy is important because it defines the start date for the backtest. The start date is also important if you are currently in the market and you would like to setup the trading strategy to signal when you should exit your position. By setting the start date closer to the current date, it will be easier to setup a trading strategy that is in a matching long or short position on the last bar of the chart.

Topic of Interest:
What are Trading Strategies?

Trading Strategy Parameters - Costs

Use the trading strategy parameters costs tab to set up the costs associated with each trade. The costs will be used when calculating your profit during the backtest.

The parameters on this tab may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

1. Select and enter the **Entry commission(s)** and **Exit commission(s)** to use during backtesting:

    Per Trade $ - Specifies a fixed dollar commission per trade.

    Per Trade % - Specifies a commission based upon a fixed percentage of the total value of each trade.

    Per Share/Contract $ - Specifies a commission based upon a fixed dollar charge per share/contract traded.

2. Select and enter the **Other costs** to use during backtesting:

    Margin % per share/contract - Specifies the percentage of the share/contract cost that you must deposit when leveraging your trades. This type of margin is generally used to backtest stock trades on margin.

    Margin $ per share/contract - Specifies the number of dollars per share/contract that you must deposit when leveraging your trades. This type of margin is typically used to backtest future trades on margin.

    Slippage per share/contract - Specifies the expected difference between the desired execution price for an order and the price at which the order is actually filled. Slippage should be used in a trading strategy if you wish to take into account real world conditions which often cause a difference in price between when you place a trade with your broker and when the trade gets filled on the floor.

    When simulating a market order, a trading strategy only uses the next bars opening price and does not take into consideration whether the opening price was at the bid or ask. By setting slippage to the expected average bid ask spread, the entry and exit prices will be adjusted as if the opening price was at the opposite side of the bid ask spread as the entry or exit would occur.

    Note that slippage is entered as the number of points you expect the market to move before the order is filled. If you have not selected 'Point value for futures contracts', then a one point move is equivalent to a one dollar change in price.

    Point value for futures contracts - Specifies the amount by which the future price is multiplied to determine the dollar value of a contract. Point value should be used in a trading strategy if you want the profit/loss results to reflect the actual dollars you gained/lost instead of the points gained/lost.

When you are satisfied with the Trading Strategy Parameters press the **OK** button to return to the Trading Strategy Wizard.

Topic of Interest:
What are Trading Strategies?

Trading Strategy Parameters - Optimization (Professional Only)

Use the trading strategy parameters optimization tab to set up the optimization objective and other optimization parameters.

The parameters on this tab may or may not be visible depending upon the currently selected Trading Strategy Wizard Interface Options. Press the **Options** button to change the Trading Strategy Wizard Interface Options. For more information see Trading Strategy Wizard Interface Options.

1. Select the **Objective to determine the best entry, stop, and exit conditions during optimization of the trading strategy**

    This is the objective that the trading strategy uses to determine w hat the "best" trading strategy is during optimization. For more information see Trading Objective Functions.

2. Setup the **Optimization parameters**.

    Shortest Average Trade Span - forces the optimization to choose a trading strategy that guarantees an average trade span greater than or equal to the Shortest Average Trade Span over the optimization period (specified on the Dates tab). Use this option is to decrease the number of trades if you find that optimization produces too many trades over the optimization period. It is recommended that you choose this option only if you are unable to achieve your goals using other methods.

    Longest Average Trade Span - forces the optimization to choose a trading strategy that guarantees an average trade span less than or equal to the Longest Average Trade Span over the optimization period (specified on the Dates tab). Use this option to increase the number of trades if you find that optimization produces too few trades over the optimization period. It is recommended that you choose this option only if you are unable to achieve your goals using other methods.

    Optimize for exactly - Forces the optimization to take a specified amount of time. Because of the nature of genetic optimization, it is impossible to determine the exact optimization time or even w hen the best trading strategy has been found. Without this parameter selected, optimization w ill automatically stop after it has decided that a better trading strategy is unlikely to be found in the future. Set this parameter to a longer to make absolutely sure that the best trading strategy has been found. Set this parameter to a shorter time to stop optimization before the best trading strategy has been found.

    Optimize across all chart pages - Forces the optimization to choose the same rules and parameters for each chart page. The optimization w ill find the rules and parameters that perform best across all chart pages by using the average result across all chart pages instead of trying to optimize the individual results for each chart page. Use of this parameter w ill result in w orse results than optimizing each chart page individually, but w ill provide more consistent and generalized rules and parameters across the chart pages.

When you are satisfied w ith the Trading Strategy Parameters press the **OK** button to return to the Trading Strategy Wizard.

Topic of Interest:
What are Trading Strategies?

Trading Strategy Detailed Analysis - Statistics

This screen shows the general statistics for the selected backtest or the selected average of the backtests. Using this information, you can evaluate how well you have setup your trading strategy.

The following is a list of results that you will receive for the selected backtest evaluated by All trades, Long only, and Short only:

Start Date - The first date included in the backtest. (DayTrader Only) See note below regarding start date.

End Date - The last date included in the backtest

Beginning Price - The closing price on the start date

Ending Price - The closing price on the end date

Change in Price - The difference between the beginning and ending price

Percent Change in Price - The percent difference between the beginning and ending price.

Annual Percent Change in Price - The annualized percent change in price. Annual Percent Change in Price = 365 * (Percent Change in Price) / (Number of Calendar days between Start Date and End Date)

Return on Trades - The cumulative sum of all returns for each trade (including any open profit/loss on the last day of the backtest). For long trades, Return = 100 * ((exit price - entry price) * shares) - exit commission) / (entry price * shares + entry commission). For short trades, Return = 100 * ((entry price - exit price) * shares) - exit commission) / (entry price * shares + entry commission). Note that the entry and exit price incorporate any specified slippage and/or point value. For more explanation refer to Return on Account vs. Return on Trades.

Annual Return on Trades - The annualized return on trades. Annual Return on Trades = 365 * (Return on Trades) / (Number of Calendar days between Start Date and End Date). For more explanation refer to Return on Account vs. Return on Trades.

Return on Account - The net profit relative to the account size required to trade over the backtest (including any open profit/loss on the last day of the backtest). Return on Account = 100 * (Net Profit) / (Account Size Required). For more explanation refer to Return on Account vs. Return on Trades.

Annual Return on Account - The annualized return on account. Annual Return on Account = 365 * (Return on Account) / (Number of Calendar days between Start Date and End Date). For more explanation refer to Return on Account vs. Return on Trades.

Net Profit - The total dollar profit/loss for the trading strategy during the backtest (including any open profit/loss on the last day of the backtest). Net Profit = (Gross Profit) - (Gross Loss)

Gross Profit - The total profit for all profitable trades over the backtest (including any open profit/loss on the last day of the backtest). For long trades with an entry price < exit price, Trade Profit = exit price - entry price - commissions. For short trades with an exit price < entry price, Trade Profit = entry price - exit price - commissions. Note that the entry and exit price incorporate any specified slippage and/or point value.

Gross Loss - The total loss for all losing trades over the backtest (including any open profit/loss on the last day of the backtest). For long trades with an entry price > exit price, Trade Loss = entry price - exit price - commissions. For short trades with an exit price > entry price, Trade Loss = exit price - entry price - commissions. Note that the entry and exit price incorporate any specified slippage and/or point value.

Ratio Gross Profit/Loss - The gross profit relative to the gross loss. Ratio Gross Profit/Loss = (Gross Profit) / (Gross Loss)

Percent Profitable Trades - The percent of the trades over the backtest that were profitable. Percent Profitable Trades = 100 * (Number Winning Trades) / (Number of Trades)

Number Trades - The number of trades over the backtest.

Number Winning Trades - The number of trades over the backtest that were profitable.

Number Losing Trades - The number of trades over the backtest that were not profitable.

Largest Winning Trade Profit - The most profit made by a trade during the backtest.

Largest Losing Trade Loss - The largest loss caused by a trade during the backtest.

Average Trade Profit - The average gain (or loss) across all trades in the backtest. Average Trade Profit = Net Profit / Number Trades

Average Winning Trade Profit -The average gain across all profitable trades in the backtest. Average Winning Trade Profit = (Gross Profit) / (Number Winning Trades)

Average Losing Trade Loss - The average loss across all losing trades in the backtest.

Ratio Avg Win/Avg Loss - The average winning trade profit relative to the average losing trade profit. Ratio Avg Win/Avg Loss = (Average Winning Trade Profit) / (Average Losing Trade Loss)

Maximum Consecutive Winners - The maximum number of consecutive profitable trades during the backtest.

Maximum Consecutive Losers - The maximum number of consecutive losing trades during the backtest.

Average Trade Span - The average number of bars between the entry order signal and the exit order execution for each trade in the backtest.

Average Winning Trade Span - The average number of bars between the entry order signal and the exit order execution for each profitable trade in the backtest.

Average Losing Trade Span - The average number of bars between the entry order signal and the exit order execution for each losing trade in the backtest.

Longest Trade Span - The largest number of bars between the entry order signal and the exit order execution for any single trade during the backtest.

Longest Winning Trade Span - The largest number of bars between the entry order signal and the exit order execution for any single profitable trade during the backtest.

Longest Losing Trade Span - The largest number of bars between the entry order signal and the exit order execution for any single losing trade during the backtest.

Largest Shares Traded - The largest number of shares traded during any single trade during the backtest.

Largest Winning Shares Traded - The largest number of shares traded during any single profitable trade during the backtest.

Largest Losing Shares Traded - The largest number of shares traded during any single losing trade during the backtest.

Average Shares Traded - The average number of shares traded for each trade in the backtest.

Average Winning Shares Traded - The average number of shares traded for each profitable trade in the backtest.

Average Losing Shares Traded - The average number of shares traded for each losing trade in the backtest.

Commissions Paid - The total amount of commissions paid during the backtest.

Maximum Drawdown - The maximum value of draw down, where the draw down at each bar is the difference between the highest prior closed net profit and the current open net profit. Draw down = (Largest Net Profit prior to trade entry) - (Net Profit prior to trade entry) + (Open Trade Draw down)

Maximum Open Trade Drawdown - The maximum open trade draw down for any trade during the backtest. Open Trade Draw down = (shares traded) * [(entry price) - (worst price during the trade)]. Note that the entry price incorporates any specified slippage and/or point value.

Required Account Size - If a margin per contract has been selected on the trading parameters screen, then the Required Account Size = (Maximum Draw down) + (Margin Per Contract) * (Largest Contracts Traded). If no margin per contract has been selected, then the Required Account Size is the largest entry cost where Entry Cost = (number of shares traded) * (entry price) - (Net Profit prior to trade entry). Note that the entry price incorporates any specified slippage and/or point value.

Notes:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.
- (DayTrader Only) The Start Date corresponds to the date/time of the first bar in the backtest. It should be noted that a bar's time is when the bar is complete and not when the bar started.

  For example, on a 30 minute chart, the 10:00am bar contains all the price action from 9:30am to 10:00am. If the Start Date was at 10:00am, then the 10:00am bar was the first bar used for backtesting and therefore the backtest includes price action starting at 9:30am.

Topic of Interest:

What are Trading Strategies?

Trading Strategy Detailed Analysis - Trade by Trade

This screen shows the trade by trade results for the selected backtest. Using this information, you can evaluate how well you have setup your trading strategy.

The following is a list of items that you will receive for each entry and exit signal in the backtest:

Date - Date on which the entry or exit was signaled.

Signal - The type of order (Long Entry, Long Exit, Short Entry, or Short Exit). On the graph, a Long Entry is annotated with a solid blue upward triangle, a Long Exit is annotated with a blue outlined downward triangle, a Short Entry is annotated with a solid red downward triangle, and a Short Exit is annotated with a red outlined upward triangle.

Shares - The number of shares (or contracts) bought or sold with the order.

Fill Date - Date on which the entry or exit was actually filled. For the simple case of a market order, the date will be the next trading day after the signal.

Price - The price at which the order was filled. On the graph, this price is annotated with an X on the Fill Date. For the simple case of a market order with no slippage the price is the open on the Fill Date. If no open is included in your data, then the previous days close is used and adjusted for gaps if a high and low is included in your data (i.e. if today's low is higher than yesterday's close then the low will be used as today's open).

Commission - The commission paid for the order. If you have not specified any entry or exit commissions in the trading parameters, this value will be zero.

%Return (exit only) - % return for the position that was exited.

> %Return is calculated as follows:
>
> > Long Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (entry price*shares – entry commissions).
> >
> > Short Percent Return = 100 * ((exit price - entry price)*shares - entry commission - exit commission) / (entry price*shares – entry commissions).
>
> If using margin $ per share/contract, then % return is calculated as follows:
>
> > Long Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (margin*contracts – entry commissions)
> >
> > Short Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (margin* contracts – entry commissions)
>
> Note that the entry and exit price incorporate any specified slippage and/or point value.

Profit/Loss (exit only) - The dollar amount made (or lost) by the position that was exited.

Cum %Ret (exit only) - The cumulative percent return for all positions up to and including the position just exited.

Cum Profit/Loss (exit only) - The cumulative profit (or loss) for all positions up to and including the position just exited.

Note:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topic of Interest:

What are Trading Strategies?

Trading Strategy Detailed Analysis - Trading Rules

This screen show s the consolidated trading rules that w ere used to calculate the backtest that you selected. (Professional Only) This is particularly important during optimization because you w on't have any other w ay to determine w hat the rules are for each instrument. Remember that the rules for each instrument w ill probably be different because they have been optimized individually.

Note:

- It should be understood that trading can result in losses, and that past performance of a trading system is no guarantee of future performance.

Topic of Interest:

What are Trading Strategies?

Print/Export - Setup

The Print/Export - Setup interface allows you to select the type of print/export you want to perform. Using this interface you may print to a printer (portrait or landscape), export to a file, or copy to the clipboard:

- To print to a printer (this option may not be available if you don't have a printer defined in your windows environment):
    1. Select the **Printer** option.
    2. Select if you want to print in Landscape mode or Portrait mode.

- To write to a file:
    1. Select the **File** option.
    2. Enter the name of the file that you want to write to (you may use the **Browse** button to help you).

- To copy to a clipboard:
    1. Select the **Clipboard** option.

When you have completed selecting how you want to setup your print/export select the **OK** button to execute the print/export or select the **Selection** tab to select what you want to print/export.

Print/Export - Selection (Trading Strategy Detailed Analysis)

The Print/Export - Selection interface allow s you to select w hat you w ant to print/export. Using this interface you may select exactly w hat you w ant to print/export.

The Print/Export - Selection interface w ill list the items that are in your trading strategy detailed analysis, w hich are Statistics, Trade By Trade, and Trading Rules.

Any of the items that are checked w ill be printed/exported and any of the items that are not checked w ill not be printed/exported.

When you have completed selecting w hat you w ant to print/export select the **OK** button to execute the print/export or select the **Setup** tab to select the type of print/export you w ant to perform.

Modifying Trading Strategies

Modifying trading strategies allow s you to modify the currently selected trading strategy. This may be useful if you w ant to recalculate the backtest results, change the trading strategy parameters (i.e. Size of backtest used to evaluate trading strategy), or the long and short signals.

1. Select a trading strategy displayed on the chart by **clicking** on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Once the prediction is selected (highlighted w ith black boxes), select **Modify Selected Trading Strategy** from the **Edit** menu.

or

1. Select a trading strategy displayed on the chart by **right-clicking** on the corresponding **line** or **legend text**.
2. Select **Modify Selected Trading Strategy** from the pop-up menu.
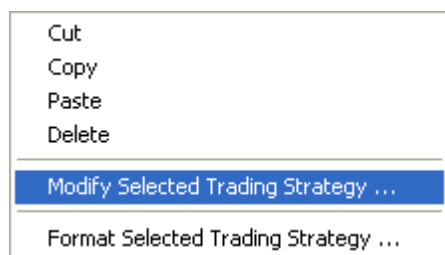
or

1. Modify a trading strategy displayed on the chart by **double-clicking** on the corresponding **line** or **legend text**.

Troubleshooting:

- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection w ill not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting tw o data points.
- In order to recalculate a backtest you must select the **Rebacktest** button (from the Trading Strategy Wizard - Results Summary).

Topic of Interest:
What are Trading Strategies?

What are Alerts? (Professional Only)

Alerts are a set of conditions that, when all are true at the same time, give a notification to you. When this set of conditions activates an alert, it will be shown in the Alert Window automatically, pop up the Alert Window (if desired), play a sound (if desired), and show the change in alert status on your screen (if not hidden from view).

Creating an Alert (Professional Only)

Creating an alert will allow you to add alerts to your chart that are used to inform you of events that you define.

1. Select **New Alert** from the **Insert** menu. This activates the alert wizard, which guides you through the process of creating an alert.
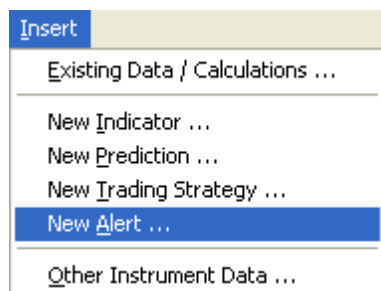
Note:

- You may have multiple alerts displayed on one chart by simply creating more than one alert.

Topic of Interest:

What are Alerts? (Professional Only)

Alert Wizard - List Conditions (Professional Only)

Listing conditions allow s you to select the conditions that you w ant to be true for the alert to be raised. Note that all of the conditions must be true for the alert to be activated.

Make a list of the conditions you w ish to use for your alert.

- To add data items to the list:
    1. Press the **Add Condition(s)** button.

- To modify or replace an item in the list:
    1. Select the item in the list you w ish to modify.
    2. Press the **Modify Condition** button.
    Or
    1. Double-Click the condition.

- To remove items from the list:
    1. Select the item or items in the list you w ish to remove.
    2. Press the **Remove Condition(s)** button or press the **delete** key on your keyboard.

When you are finished making a list of conditions that you w ish to use for your alert press the **Next** button to proceed to the next w izard screen.

Topic of Interest:
What are Alerts? (Professional Only)

Alert Wizard - Properties (Professional Only)

Setting the properties of the alert will allow you to control how the Alert will be displayed and heard (if desired).

To set the properties of the Alert:

1. Select the **Name** of Alert, this is what will be displayed on the chart and in the Alert Window when the alert occurs.
2. Enter a **Description** (if desired) of the Alert, this will be displayed in the Alert Window when the alert occurs.
3. Select **Popup Alert Window** if you want this alert to automatically popup the Alert Window when the alert occurs. Otherwise (if you don't want the Alert Window popping up), deselect this option.
4. Select **Play sound file** if you want this alert to play a sound when the alert occurs. Additionally you must select which sound that you want the alert to play. If you don't want the alert to play a sound deselect this option.
5. Press the **Finish** button to end the wizard and display the alert.

Tip:

- The list of available sounds is compiled from all the .WAV sound files located in the Sounds subdirectory (C:\NeuroShell Trader\Sounds). If you would like to use a custom sound not provided with NeuroShell Trader, simply copy the desired .WAV sound file into the Sounds subdirectory prior to running NeuroShell Trader.

Topic of Interest:

What are Alerts? (Professional Only)

Modifying Alerts (Professional Only)

Modifying alerts allow s you to modify the currently selected alert. This may be useful if you w ant to change the conditions of an alert (i.e. moving average crossover periods), or the properties of the alert (i.e. sound played or name).

1. Select an alert displayed on the chart by **clicking** on the corresponding **line**, **legend text**, or **Snapshot View text**.
2. Once the indicator is selected (highlighted w ith black boxes), select **Modify Selected Indicator** from the **Edit** menu.

Edit	
Cu_t	Ctrl+X
_Copy	Ctrl+C
_Paste	Ctrl+V
_Delete	Del
Modify Selected Alert ...	

or

1. Select an indicator displayed on the chart by **right-clicking** on the corresponding **line** or **legend text**.
2. Select **Modify Selected Alert** from the pop-up menu.

Cut
Copy
Paste
Delete
Modify Selected Alert ...
Format Selected Alert ...
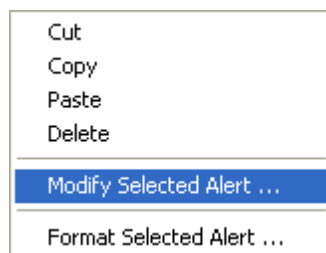
Troubleshooting:
- You must make sure the mouse cursor has changed to a **hand** before clicking on the **line** or **legend text**. If the cursor is still an arrow or a cross hair, the selection w ill not occur. If you are selecting a line on the chart, it is best to position the cursor over a data point instead of the portion of the line connecting tw o data points.

Alerts and Orders Window (Professional Only)

The Alerts and Orders Window displays the alerts, active trading strategies, current market positions and trading orders for all charts. It shows lists of the alerts, active trading strategies, current market positions, all trading orders, open trading orders, filled trading orders, and canceled trading orders.

To view the Alerts & Orders Window :

1.   Select **Alerts and Orders Window** menu item from the **View** menu.

To hide the Alerts and Orders Window deselect the **Alerts and Orders** Window menu item from the **View** menu.

Topic of Interest:
What are Alerts? (Professional Only)

Alerts and Orders Window - Active Trading (Professional Only)

The **Active Trading** view of the Alerts and Orders Window displays all the trading strategies across all open charts, with a check next to strategies that are currently active. Only active trading strategies will show their position and orders in the other tabs of the Alerts and Orders Window.

Additionally, only active trading strategies will give sound accompanied pop-up order notification when the sound and pop-up order options are active (the sound and pop-up order notification options are accessed using the **Options** menu item in the **Tools** Menu).

If you have selected **Send Orders to Brokerage** option (accessed using the **Options** menu item in the **Tools** Menu), then active trading strategies will send orders directly to the selected brokerage.

To activate or deactivate a trading strategy, select or unselect the trading strategy using the check box to the left of the ticker symbol.

The following is a description of each column in the Active Trading view:

Position – The current position of the ticker symbol. Possible positions include none, long, and short.

Shares – The number of shares/contracts being bought or sold.

Symbol – The ticker symbol for the trading strategy. There will be one ticker symbol for each chart page in the chart.

Strategy – The name of the trading strategy.

Chart – The chart name on which the trading strategy resides.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.

Note:

- Only trading strategies can be activated. To get position status, order status, and order notification for a prediction, create a trading strategy based upon the prediction and then activate that strategy.

Alerts and Orders Window - Alerts (Professional Only)

The **Alerts** view of the Alerts and Orders Window displays all the alerts that have occurred on all open charts.

The following is a description of each column in the Alerts view :

Date – The time and date w hen the alert occurred.

Chart – The chart name on w hich the alert resides.

Symbol – The ticker symbol on w hich the alert occurred.

Alert – The name of the alert.

Description – The alert description.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.

Alerts and Orders Window - All Orders (Professional Only)

The **All Orders** view of the Alerts and Orders Window displays the status of all trading orders that have been placed for active trading strategies. Only those orders that have occurred since a trading strategy was activated will be shown in this view.

The following is a description of each column in the All Orders view:

Status – The current status of the order. Possible statuses include Open, Filled, and Canceled.

Action – The action of the order. Possible actions include Buy Long, Sell Long, Sell Short, or Cover Short.

Shares – The number of shares/contracts being bought or sold.

Symbol – The ticker symbol being traded.

Order – The order type. Possible order types include Market, Stop XX, Limit XX, Stop XX Limit XX, and Market Close (where XX represents the stop or limit price).

Last Price – The last price of the symbol.

Fill Price – The price at which the order was filled in the market (if status is Filled)

Time Filled/Canceled – The time that the order was filled in the market (if status is Filled) or the time that the order was cancelled by the trading strategy (if status is Canceled)

Time Placed – The time the order was generated by the trading strategy.

Strategy – The name of the trading strategy that generated the order.

Chart – The chart name on which the trading strategy resides.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.

Alerts and Orders Window - Canceled Orders (Professional Only)

The **Canceled Orders** view of the Alerts and Orders Window displays all the trading orders for active trading strategies that were cancelled before they ever got filled.

In general, market orders will be filled almost immediately during market hours. Order types like stops and limits will remain open until their target price is reached or the trading strategy cancels them.

The following is a description of each column in the Open Orders view :

   Action – The action of the order. Possible actions include Buy Long, Sell Long, Sell Short, or Cover Short.

   Shares – The number of shares/contracts being bought or sold.

   Symbol – The ticker symbol being traded.

   Order – The order type. Possible order types include Market, Stop XX, Limit XX, Stop XX Limit XX, and Market Close (where XX represents the stop or limit price).

   Last Price – The last price of the symbol.

   Time Canceled – The time that the order was filled in the market (if status is Filled) or the time that the order was cancelled by the trading strategy (if status is Canceled)

   Time Placed – The time the order was generated by the trading strategy.

   Strategy – The name of the trading strategy that generated the order.

   Chart – The chart name on which the trading strategy resides.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.
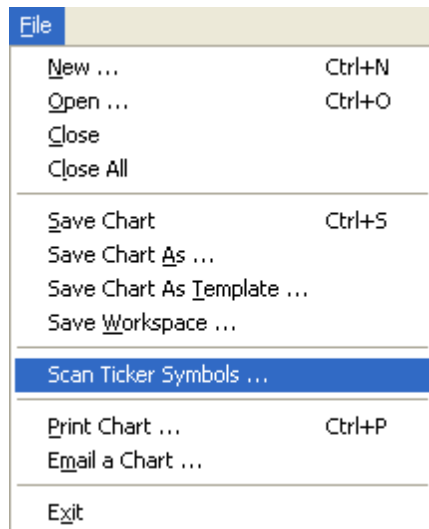
Alerts and Orders Window - Filled Orders (Professional Orders)

The **Filled Orders** view of the Alerts and Orders Window displays all the trading orders for active trading strategies that have been executed in the market.

In general, Market orders will be filled almost immediately during market hours. Order types like Stops and Limits will remain open until their target price is reached or the trading strategy cancels them.

The following is a description of each column in the Open Orders view:

- **Action** – The action of the order. Possible actions include Buy Long, Sell Long, Sell Short, or Cover Short.
- **Shares** – The number of shares/contracts being bought or sold.
- **Symbol** – The ticker symbol being traded.
- **Order** – The order type. Possible order types include Market, Stop XX, Limit XX, Stop XX Limit XX, and Market Close (where XX represents the stop or limit price).
- **Last Price** – The last price of the symbol.
- **Fill Price** – The price at which the order was filled in the market.
- **Time Filled** – The time that the order was filled in the market.
- **Time Placed** – The time the order was generated by the trading strategy.
- **Strategy** – The name of the trading strategy that generated the order.
- **Chart** – The chart name on which the trading strategy resides.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.

Alerts and Orders Window - Open Orders (Professional Only)

The **Open Orders** view of the Alerts and Orders Window displays all the currently unfilled trading orders that have been placed for active trading strategies. Once an order is filled or canceled, it will be removed from this view and moved to the appropriate Filled or Canceled orders view.

In general, Market orders will be filled almost immediately during market hours. Order types like Stops and Limits will remain open until their target price is reached or the trading strategy cancels them.

The following is a description of each column in the Open Orders view:

Action – The action of the order. Possible actions include Buy Long, Sell Long, Sell Short, or Cover Short.

Shares – The number of shares/contracts being bought or sold.

Symbol – The ticker symbol being traded.

Order – The order type. Possible order types include Market, Stop XX, Limit XX, Stop XX Limit XX, and Market Close (where XX represents the stop or limit price).

Last Price – The last price of the symbol.

Time Placed – The time the order was generated by the trading strategy.

Strategy – The name of the trading strategy that generated the order.

Chart – The chart name on which the trading strategy resides.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.

Alerts and Orders Window - Positions (Professional Only)

The **Positions** view of the Alerts and Orders Window displays the current market position for all active trading strategies. Long positions will be colored blue, short positions will be colored red, and no position will be colored gray.

The following is a description of each column in the Positions view :

Position – The current position of the ticker symbol. Possible positions include none, long, and short.

Shares – The number of shares/contracts being bought or sold.

Symbol – The ticker symbol being traded.

Fill Price – The price at which the entry order was filled in the market.

Last Price – The last price of the symbol.

Profit – The current open profit of the position if it was closed at the last price.

Time Placed – The time the order was generated by the trading strategy.

Entry Time – The time that the entry order was filled in the market

Strategy – The name of the trading strategy that generated the order.

Chart – The chart name on which the trading strategy resides.

To hide the Alerts and Orders Window deselect the **Alerts and Orders Window** menu item from the **View** menu.

What is Ticker Symbol Scanning

Ticker Symbol Scanning is a w ay of searching a large number of ticker symbols for user defined criteria or indicator values. Ticker scanning enables you to develop a systematic approach to selecting ticker symbosl to trade and test how systems do on ticker symbols that match a given criteria.

The NeuroShell Trader Ticker Scanning Wizard makes it easy to implement scanning of ticker symbols for any number of user created criteria or values. Once scanning is complete, you w ill be able to sort the ticker symbols on the criteria or values and create a chart w ith those criteria and values for the ticker symbols of your choice.

Creating a Ticker Symbol Scan

Creating a trading strategy will allow you to add buy/sell signals to your chart that are based upon rules that you define.

1. Select **Scan Ticker Symbols …** from the **File** menu. This activates the ticker symbol scanning wizard, which guides you through the process of creating a scan.

File	
New …	Ctrl+N
Open …	Ctrl+O
Close	
Close All	
Save Chart	Ctrl+S
Save Chart As …	
Save Chart As Template …	
Save Workspace …	
Scan Ticker Symbols …	
Print Chart …	Ctrl+P
Email a Chart …	
Exit	

Topic of Interest:
What is Ticker Symbol Scanning

Scanning Wizard - Choosing a Template

This screen show s the scanning templates available for use. Scanning templates are preconfigured scans that allow you to create a ticker symbol scan quickly w ithout having to w orry about all the details of creating one from scratch.

To select an existing template:

1.   Select the desired template from the list.

To create a scan from scratch

1.   Select (No Template) located at the top of the list.

When you are satisfied w ith the template the scan w ill use press the **Next** button to proceed to the next w izard screen.

Notes:

- Any scan that is saved by selecting **Save as Template** button on the last scanning w izard page w ill be available as a scan template in template list. Therefore, if you w ant to create your ow n custom scanning templates, you need only create a scan from scratch and then save it as a template on the last w izard page.

Scanning Wizard - Choosing a Periodicity and First Date

Selecting the scan periodicity and first date enables you to choose the frequency and amount of data used in the scan.

The periodicities available are as follows:

Monthly Each bar represents one month of trading activity

Weekly Each bar represents one week of trading activity

Daily Each bar represents one day of trading activity

(Day Trader Only)

Hour Each bar represents trading activity for the user-specified number of hours.

Minute Each bar represents trading activity for the user-specified number of minutes.

Second Each bar represents trading activity for the user-specified number of seconds.

Tick Each bar represents trading activity for the user-specified number of trades.

Volume Each bar represents trading activity for the user-specified minimum volume. The volume of each bar will equal the specified volume. Each bar is created by accumulating trades until the specified volume is reached. Since trades are not split across bars, a bar's volume may exceed the specified volume if the volume of the last trade is greater than needed to exactly reach the specified volume.

Range Each bar represents trading activity for the user-specified minimum price range. The high-low range of each bar will equal the specified range. Each bar is created by accumulating trades until the high-low range is reached. The first trade to break outside that range starts a new bar. Since price gaps are not filled with phantom bars, the high-low range of a bar can exceed the specified range when prices gap outside the range before a bar's price range criteria was met.

To choose a chart periodicity and first date:

1. **Select a periodicity for the scan** by clicking on the desired periodicity of either daily, weekly, monthly, (DayTrader Only) or intraday. If you chose intraday, you should also enter the desired intraday bar size (i.e. 1, 2, 3, …) in the text box and select the desicred bar type (i.e. Hour Bars, Minute Bars, Second Bars, Tick Bars, or Volume Bars). Note that Second, Tick, and Voume bars may not be supported depending upon the data feed being used and therefore Second, Tick, and Volume may not displayed.

2. **Choose how far back to initially load data** by entering a date, using the up/down buttons to change the day/month/year, or selecting the dropdown arrow to select a date from the calendar.

3. Press the **Next** button to proceed to the next wizard screen.

Notes:

- (DayTrader Only) Note that Second, Tick, Volume and Range bars are created from tick by tick data streams and therefore historical data may be limited and take longer to load.

- (DayTrader Only) Second, Tick, Volume and Range bars can only be created using Quote.com or eSignal and will therefore not be visible when using other data feeds.

- NeuroShell Trader will handle all data conversion if you choose a chart periodicity different from the data files upon which the scan is based.

  Example #1: If you create a monthly scan based upon daily data files, NeuroShell Trader will set the monthly open equal to the first daily open, the monthly high equal to the highest daily high, the monthly low equal to the lowest daily low, and the monthly close equal to the last daily close. Additionally, the monthly volume & open interest equal to the sum of all daily volumes & open interests, and all other monthly data values equal to the last daily data value.

  Example #2: If you create a daily scan based upon monthly data files, data points will only occur once a month. However, if you insert other instrument data that comes from a daily data file, the new instrument will have data every day and the original data will be extended so that each day has the last monthly value.

Scanning Wizard - Selecting an Instrument Category

Selecting the instrument category w ill select w hat type of scan you w ant to view . From this point on everything in your scan w ill be based on this type of instrument data (you w ill alw ays be able add other instrument data to the scan, but the tickers actually scanned w ill be based upon this type of instrument data).

1. Select the type of instruments you w ish to scan.
2. Press the **Next** button to proceed to the next w izard screen.

Troubleshooting:

- If you think the categories listed are incorrect or some categories are missing, you w ill need to change your data sources settings. To do this, press the **Cancel** button and select **Data Sources** from the **Tools** menu. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.

Scanning Wizard - Selecting Instruments

Selecting the instruments that you w ant to scan allow s you to choose the instruments for w hich you w ant to view criteria and values.

1. Select the instrument or instruments you w ish to scan.
3. Press the **Next** button to proceed to the next w izard screen.

To sort by ticker symbol:

1. Select the **Sort by Symbol** option.

To sort by name/description:

1. Select the **Sort by Name** option.

To show only the items selected in your list:

1. Select the **Selected items only** option.

To show all the items in the list (both selected and not selected):

1. Deselect the **Selected items only** option.

If you are using Quote.com, eSignal or Prophet.net as your data source, you have the option of adding instruments that are not already listed. To add a new ticker symbol:

1. Press the **Add New Quote.com Ticker Symbol**, the **Add New eSignal Ticker Symbol** or the **Add New Prophet.net Ticker Symbol** button.
2. Enter the instrument's ticker symbol into the **Ticker** box
3. Enter the instrument's full name into the **Name** box
4. Select the instrument's category using the **Category** drop dow n box.
5. Press the **OK** button to add the new instrument.

Notes:

- If you are using the data that came on the NeuroShell Trader Historical Data CD or the data installed in the NeuroShell Trader Data subdirectory, you may see extra letters after the stock name (For example: Microsoft MSQ ZMF ZJZ). This is an indication that the stock is an optionable stock and the letters are the actual root symbols for the stock's option contracts.

Tips:

- To select a group of instruments, hold the **left mouse button** dow n w hile you **drag** the mouse over the desired instruments.
- If you are unable to find a ticker, you'll w ant to make sure that your data is setup correctly. For information on how to setup your data review : Setting Up Data Directories and/or Setting Up Data Server.

Scanning Wizard - Adding Values to Scan

This list contains the values that w ill be scanned for each ticker. You may add one or more data series, indicators, or other instrument data values. For each added value, the scan results screen w ill dispaly the calculated value for each of the scanned ticker symbols.

Make a list of the values for w hich you w ish to scan.

- To add data items to the list:
    1. Press the **Add Value(s)** button.

- To modify an input, input's parameter, or (Professional Only) input's parameter range:
    1. Select the item in the list you w ish to modify.
    2. Press the **Modify Value …** button.
    Or
    1. By **double-clicking** on the item in the list you w ish to modify.

- To remove items from the list:
    1. Select the item or items in the list you w ish to remove.
    2. Press the **Remove Value(s)** button or press the **delete** button on you keyboard.

When you are finished making a list of values for w hich you w ish to scan, press the **Next** button to proceed to the next w izard screen.

Scanning Wizard - Scan Results

This screen show s the results of scan after all the ticker symbols have been scanned and the calculations are finished computing.

If at any time during scan, you w ant to abort, press the **Stop Scanning** button.

After the scanning has finished, you may do any of the follow ing:

- Sort the results list by clicking on the column header by w hich the list should be sorted. Clicking once w ill sort the list in ascending order based upon the values in that column. Clicking a column header a second time w ill sort the list in descending order based upon the values in that column.
- Select the ticker symbols for w hich you w ish to create a chart by clicking the mouse button in the square to the left of each ticker symbol in the results list.
- Press the **Finished** button to end the w izard and create a chart that has the scan values/indicators already created for the ticker symbols that are checked in the results list.
- Press the **Back** button to modify the scan.
- Press the **Cancel** button to exit the scanning w izard w ithout saving any results.
- Press the **Save as Template** button to save the scan as a new scanning template. Saving the scan as a template allow s you to redo the scan at a later time w ithout having to recreate the scan from scratch.

Topic of Interest:
What is Ticker Symbol Scanning

What is Integrated Brokerage Trading

Integrated Brokerage Trading allow s trades from a Trading Strategy to be sent directly to a brokerage.

To setup integrated trading w ithin NeuroShell Trader
1.   Select **Options** from the **Tools** menu to activate the Options Dialog.
2.   Select **Send orders to brokerage** from the **Trading Orders** tab.
3.   Select the desired brokerage server from the **Brokerage** drop-dow n list

The follow ing are the brokerage servers distributed w ith NeuroShell Trader that can be selected in the **Brokerage** drop dow n list:

  Interative Brokers – Sends trades to Interactive Brokers. For more detailed information see: Interactive Brokers

  Order Emailer – Emails trades to a list of email addresses. For more detailed information see: Order Emailer

Notes:

- Additional brokerage servers may be available from third party developers or developed using the NeuroShell Trader Brokerage API. Once installed, additional brokerage servers w ill be listed in the **Brokerage** drop dow n list.

- While integrated trading is occurring, the price bars of the trading strategy w ill be colored yellow . If you save and reload a chart that w as being actively trading, the old fill prices and yellow areas of active trading w ill also be saved and redisplayed.

Interactive Brokers

Interactive Brokers (www.interactivebrokers.com) is the default brokerage supported by NeuroShell Trader's integrated trading interface.

To setup integrated trading so that NeuroShell Trader sends sends trades to an Interactive Brokers account, Interactive Brokers paper trading account, or Interactive Brokers demo account:

1) Select **Options** on the **Tools** menu.
2) Select the **Send orders to brokerage** option located on the **Trading Orders** tab.
3) Select **Interactive Brokers** from the **Brokerage** drop-down list.

> Note: If **Popup order prompt/confirmation** is checked, then NeuroShell Trader will ask you if you want to send orders before sending them, otherwise it will simply send orders without user interaction.

4) At this point, any chart you load that has a trading strategy will NOT automatically start sending orders to a brokerage. Only charts that have active trading already setup will send trades to the brokerage. To setup active trading on a chart, select **Alerts/Orders Window** from the **View** menu and select the Trading Strategies on that you wish to actively trade from the list on the **Active Trading** tab of the Alerts/Orders window.

5) When you first select a trading strategy to actively trade, you get a message box saying "About to establish a connection with Interactive Brokers". If you do not follow the instructions (shown below), NeuroShell Trader will NOT be able to communicate with Interactive Brokers due to restrictions in the interface provided by Interactive Brokers.

   a. Make sure the IB Trader Workstation is loaded and running before pressing OK.

      Ward Systems Group highly recommends using Interative Broker's demo workstation or a paper trading account before making live trades.

      The demo workstation is for evaluation purposes and doesn't actually make trades in the market. Using the demo workstation first allows you to be confident that your system is working as desired and that the communications between NeuroShell Trader and Interactive Brokers is working properly on your computer. To load a demo version of the IB Trader Workstation, goto www.interactivebrokers.com, choose 'Software' on the upper menu bar, and select "Trader Workstation" and then "Demo". Follow the instructions to run the Individual Demo.

      If you have an account with Interactive Brokers, you can also request a paper trading account from Interactive Brokers. A paper trading account works just like a real Interactive Broker's account, except you are issued a different logon id/password and the trades are not actually placed with the market. A paper trading account is another excellent way to test that your system is working as desired and that the communications between NeuroShell Trader and Interactive Brokers is working properly on your computer before you start live trading.

      If you have an account with Interactive Brokers and you wish to make live trades, then simply load up the Interactive Brokers Trader's Workstation as you would normally to place trades with Interactive Brokers.

   b. Verify client support is configured in the IB Trader Workstation

      To make sure client support is configured in the IB Trader Workstation (TWS), goto the 'Configure' Menu on the TWS menu screen, select the 'API' menu item and make sure the 'Enable ActiveX and Socket Clients' is checked.

   c. Choose Yes on the 'Accept Incoming Attempt prompt in the IB Trader Workstation

      Once you hit OK, NeuroShell Trader tries to establish a connection. The IB Trader Workstation (TWS) puts up a message box to verify that you want to make the connection. If you do not go back to the IB TWS and press Yes, then trades sent from NeuroShell Trader will not reach the IB TWS.

6) If you haven't already specified a ticker and exchange mapping for the underlying data feed ticker symbol using the **Ticker/Exchange Mapping** button on the Options dialog, you will be prompted to enter an appropriate ticker and exchange mapping when you first activate a trading strategy. You must enter the Ticker Symbol, Exchange, and Security Type exactly as expected by Interactive Brokers before NeuroShell Trader will allow you to activate integrated trading. Note that futures ticker symbols are entered in the symbol mode format (for example ESH6) and not the underlying mode format (for example ES).

Now whenever a new trade occurs in an activated Trading Strategy, if you have selected "Popup Order Prompt/Confirmation", a pop-up order confirmation will be displayed which allows modification of the order and confirmation that you want to send the order, otherwise the order will simply be sent with only a brief flash of the order on the screen. Trades sent to Interactiver Brokers should show up in the IB TWS trade screen under 'API' and/or 'Pending' tab.

Notes:

- Integrated trading will start with the first new entry order. If the trading strategy is already in a position when you activate it, the exit order for the existing position will not be sent to the brokerage.

- Fill prices from Interactive Brokers will be communicated back to NeuroShell Trader for use in the Trading Strategy. Even if price action on the chart makes it appear as if a fill should have occurred, NeuroShell Trader will only actually fill an order and proceed with subsequent trading strategy orders after Interactive Brokers has returned a fill price. If Interactive Brokers does not fill the order, neither will the NeuroShell Trading Strategy. This guarantees that the Trading Strategy will not get out of step with the orders/fills occurring with Interactive Brokers and also allows you to view the actual fill prices and related statistics within NeuroShell Trader.

- While integrated trading is occurring, the price bars of the trading strategy will be colored yellow. If you save and reload a chart that was being actively trading, the old fill prices and yellow areas of active trading will also be saved and redisplayed.

Order Emailer

The Order Emailer is one of the integrated trading servers distributed with NeuroShell Trader and supported by NeuroShell Trader's integrated trading interface. The Order emailer simply emails trades to a list of email addresses.

To setup integrated trading so that NeuroShell Trader sends sends trades to a list of email addresses:

1) Select **Options** on the **Tools** menu.
2) Select the **Send orders to brokerage** option located on the **Trading Orders** tab.
3) Select **Order Emailer** from the **Brokerage** drop-down list.

> Note: If **Popup Order prompt/confirmation** is checked, then NeuroShell Trader will ask you if you want to send orders before sending them, otherwise it will simply send orders without user interaction.

4) At this point, any chart you load that has a trading strategy will NOT automatically start sending orders to a brokerage. Only charts that have active trading already setup will send trades to the brokerage. To setup active trading on a chart, select **Alerts/Orders Window** from the **View** menu and select the Trading Strategies on that you wish to actively trade from the list on the **Active Trading** tab of the Alerts/Orders window.

Now whenever a new trade occurs in an activated Trading Strategy, if you have selected "Popup Order Prompt/Confirmation", you will be asked if you want to send the order, otherwise the order will simply be sent with only a brief flash of the order on the screen.

The Order Emailer is a separate program from NeuroShell Trader and can be accessed by clicking on the Order Emailer icon at the bottom of the screen. The Order Emailer displays detailed order instructions (order date/time/id, symbol, quantity, chart name, strategy name, etc.) in the Order instructions list box for user information.

> WARNING: The Order Emailer requires a valid POP3 mail account preset in either Outlook Express or Outlook. If you use AOL or remote mail boxes such as Yahoo, Google, etc, you most probably do not have a POP3 account and therefore the order emailer program will not work for you.

You must setup emailing capabilities before the Order Emailer will actually email trades: To activate email capabilities:

1) Select the Order Emailer icon at the bottom of the screen to display the Order Emailer interface. Note that the Order Emailer will only load and its icon will only appear after you have selected a trading strategy to be actively traded from the **Active Trading** tab of the **Alerts/Orders Window**.
2) Check the **Email order instructions to the following addresses** box and add at least one valid email address to the list.
3) To add an email address, simply press the Add button and type in the desired address. After you're done, press OK, and the email address will be added to the list.
4) The Delete button allows deleting undesired entries from the email address list.

The order emailer program itself does not actually send emails. Instead, it relies on your main email program (Outlook Express or Outlook) to do that. The order emailer puts messages in the main email program's outgoing mail box, then the main email program should actually send the message. So, in order for the whole thing to work, you must have a valid email account preset and capable of sending emails in either Outlook Express or Outlook.

After the order emailer receives order instructions from NeuroShell Trader, it composes an order message and puts it in the Outbox folder of your Outlook Express or Outlook. These programs may not send messages found in the Outbox folder immediately. To enable automatic sending, you will need to instruct your main email program to do so using the following steps:

> **Outlook Express** - go to the Tool -> Options menu and select the Send tab. Make sure that the "Send messages immediately" box is checked. Now, go to the General tab and set the "Check for new messages" box to 1 min. The reason for doing so is that the Outlook Express checks for any outgoing messages only when it checks for incoming ones.

> **Outlook** - go to the Tools -> Options menu and select the Mail Setup tab. Make sure that the "Send immediately when connected" box is checked.

Notes:
- Integrated trading will start with the first new entry order. If the trading strategy is already in a position when you activate it, the exit order for the existing position will not be sent to the brokerage.

- While integrated trading is occurring, the price bars of the trading strategy will be colored yellow. If you save and reload a chart that was being actively trading, the old fill prices and yellow areas of active trading will also be saved and redisplayed.

Exporting Chart Data/Images

Exporting chart data/images allows you to export data to import into other programs, or images to put into presentations.

Following the procedure below activates the export wizard, which guides you through the process of exporting data or images to either a file or the clipboard.

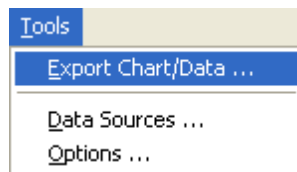1. Select **Export Chart/Data** from the **Tools** menu.

Chart Export Wizard - Defining Export

1. Select the type of export:
   - **Chart Data Values** - values for all of the dates show n on the selected chart for items on the chart
   - **Chart Image** - an image of the selected chart
   - **Snapshot Values** - values that are currently in the Snapshot view (this may be disabled if you are not currently view ing the Snapshot view)
   - **Historical Values** - values that are currently in the Historical view (this may be disabled if you are not currently view ing the Historical view)
   - **Portfolio Values** - values that are currently in the Portfolio view (this may be disabled if you are not currently view ing the Portfolio view)
2. Select the export destination:
   - **File** - a file that you w ill select later in the w izard
   - **Clipboard** - a device used to paste data or images to other programs
3. Press the **Next** button to proceed to the next w izard screen or the **Finish** button if you are copying Snapshot, Historical, or Portfolio values to the clipboard.

Chart Export Wizard - Data Items

Make a list of the Data Items you wish to export.

To add data items to the list:
1. Press the **Add Data Item(s)** button.

To remove items from the list:
1. Select the item or items in the list you wish to remove.
2. Press the **Remove Selected Data Item(s)** button

When you are finished making a list of the Data Items you wish to export press the **Next** button to proceed to the next wizard screen.

Exporting Chart Data/Images

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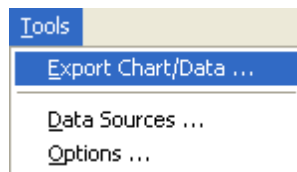1.   Select **Export Chart/Data** from the **Tools** menu.

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    - **Chart Data Values** - values for all of the dates show n on the selected chart for items on the chart
    - **Chart Image** - an image of the selected chart
    - **Snapshot Values** - values that are currently in the Snapshot view (this may be disabled if you are not currently view ing the Snapshot view)
    - **Historical Values** - values that are currently in the Historical view (this may be disabled if you are not currently view ing the Historical view)
    - **Portfolio Values** - values that are currently in the Portfolio view (this may be disabled if you are not currently view ing the Portfolio view)
2. Select the export destination:
    - **File** - a file that you w ill select later in the w izard
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  1. Select the item or items in the list you wish to remove.
  2. Press the **Remove Selected Data Item(s)** button

When you are finished making a list of the Data Items you wish to export press the **Next** button to proceed to the next wizard screen.

Chart Export Wizard - Data File

1. Select the format of the data file to be exported:
   - **Comma separated ASCII file**
   - **Tab separated ASCII file**
   - **Space separated ASCII file**
2. Enter the name of the data file to be exported (you may choose to browse your files by selecting the **Browse** button).
3. Select how many data files should be exported:
   - **Export a file for the current chart page only** – This option will export only a single file containing data for the currently selected chart page.
   - **Export a data file for each chart page in the chart** - This option will export as many files as there are chart pages.
   - **Export one data file containing data for all chart pages in the chart** – This option will export a single file that contains data for all the chart pages in the chart.
4. Press the **Finished** button to end the wizard and export the listed data items to the file in the appropriate format.

Notes:
- When using the **Export a data file for each chart page in the chart** option, the exported file names will be different for each file written. If the name of the data file to be exported includes a ticker symbol of one of the chart pages, then each data file will be named the same except with the ticker symbol replaced by the ticker symbol for the particular chart page being exported. As an example, if the file name is "Exported IBM.csv" and there are three chart pages IBM, INTC, and MSFT, then the files written would be "Exported IBM.csv", "Exported INTC.csv", and "Exported MSFT.csv". However, if the name of the data file to be exported does not contain a ticker symbol of one of the chart pages, then the files will simply be named the same as the chart page ticker symbol. For example if the file name is "junk.csv", then the files written would be "IBM.csv", "MSFT.csv", and "INTC.csv".
- When using the Export one data file containing data for all chart pages in the chart option, a Ticker data field, containing the chart pages ticker symbol, will be added to the file to distinguish data from different chart pages. The data for each additional chart page will be appended to the bottom of the previous chart page`s data (i.e. more rows of data will be added for each chart page).

Exporting Chart Data/Images

Exporting chart data/images allow s you to export data to import into other programs, or images to put into presentations.

Follow ing the procedure below activates the export w izard, w hich guides you through the process of exporting data or images to either a file or the clipboard.

1.   Select **Export Chart/Data** from the **Tools** menu.

Chart Export Wizard - Defining Export

1. Select the type of export:
   - **Chart Data Values** - values for all of the dates shown on the selected chart for items on the chart
   - **Chart Image** - an image of the selected chart
   - **Snapshot Values** - values that are currently in the Snapshot view (this may be disabled if you are not currently viewing the Snapshot view)
   - **Historical Values** - values that are currently in the Historical view (this may be disabled if you are not currently viewing the Historical view)
   - **Portfolio Values** - values that are currently in the Portfolio view (this may be disabled if you are not currently viewing the Portfolio view)
2. Select the export destination:
   - **File** - a file that you will select later in the wizard
   - **Clipboard** - a device used to paste data or images to other programs
3. Press the **Next** button to proceed to the next wizard screen or the **Finish** button if you are copying Snapshot, Historical, or Portfolio values to the clipboard.

Chart Export Wizard - Defining Image

1. Select the format of the image to be exported:
   - **Metafile**
   - **Bitmap**
2. Enter the dimensions of the image to be exported (both the Height and Width in inches).
3. Enter the name of the data file to be exported (you may choose to browse your files by selecting the **Browse** button).
4. Press the **Finished** button to end the wizard and export the image to the file selected in the appropriate format.

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   - **Metafile**
   - **Bitmap**
2. Enter the dimensions of the image to be exported (both the Height and Width in inches).
3. Enter the name of the data file to be exported (you may choose to browse your files by selecting the **Browse** button).
4. Press the **Finished** button to end the wizard and export the image to the file selected in the appropriate format.

Installing indicators and functions into TradeStation®

NOTE: This interface is included in NeuroShell Trader, but is UNSUPPORTED by Ward Systems Group since the method of obtaining data from TradeStation is not officially sanctioned by TradeStation and it may be unreliable in some situations. If you are using daily bars, the most reliable method of obtaining data from TradeStation is to export text files (see the Tradestation data window) from TradeStation and load then map and load them into NeuroShell

NeuroShell Trader has the ability to incorporate data and functions from TradeStation®. Additionally, indicators and predictions displayed in a NeuroShell Trader chart can be incorporated into TradeStation® (Unsupported Feature). Use the following procedures to install the necessary indicators and functions into TradeStation®.

Note: NSTrdExport is not a viable substitute for a data feed if you regularly trade more than a few dozen issues (ticker symbols) because the export indicator must be inserted in the chart for each issue. Furthermore, because TradeStation® does not allow us access to their feed directly, there will be timing issues as we transfer data from a TradeStation® chart to a NeuroShell chart. This means that as new bars are transferred, bars may occasionally be a tick or so off between the two systems.

To install 'NSTrdExport' and 'NSTrdImport' indicators into TradeStation®

1. Select **Import/Export EasyLanguage**® from the **File** menu.
2. **Select Import EasyLanguage file (ELD, ELS or ELA)** and press the **Next** button.
3. Click on the **Browse** button and look in your NeuroShell Trader 4 Directory for the file named NST-TS6.ELD or NST-TS7.ELD (whichever is appropriate) and then press the **Next** button.
4. Make sure both the **Function** and **Indicator** options are selected and press the **Next** button.
5. Make sure all of the listed items are checked (you can just click on **Select All** button) and press the **Finish** button. You should receive a message that you have successfully imported your analysis techniques.

TradeStation®, EasyLanguage®, and PowerEditor® are registered Trademarks of TradeStation Technologies, Inc. **Neither TradeStation Technologies nor any of its affiliates has reviewed, certified, endorsed, approved, disapproved or recommended, and neither does or will review, certify, endorse, approve, disapprove or recommend, any trading software tool that is designed to be compatible with TradeStation Open Platform.**

Topics of Interest:
Importing TradeStation Data and Indicators
Exporting Data and Indicators to TradeStation

Exporting Data and Indicators to TradeStation®

The TradeStation Import indicator is a feature which is unsupported in NeuroShell. Although the feature worked reasonably well when we introduced it, changes made to TradeStation have rendered the feature unreliable. We continue to include it for the benefit of any user who may find it reliable, but new users should not attempt to use it, and our technical support personnel cannot assist with any problems it causes.

Indicators and predictions displayed in a NeuroShell Trader chart can be incorporated into a TradeStation® chart using the procedures below :

In NeuroShell Trader:

1. Create a chart in the NeuroShell Trader and save it with an 8 character or less name (with no spaces) so it may be imported into TradeStation®.

Tips:
- If you are importing predictions made by NeuroShell Trader into TradeStation®, you may want to use the Signal version (i.e. Out of sample Signal) of the prediction or apply the "Lead" indicator to the prediction in NeuroShell Trader so that all of the predicted values will be imported by TradeStation®. This is necessary because NeuroShell Trader predicts future values and TradeStation® is unable to import future values. Therefore, we need to shift the predicted value to the day on which the prediction is made. Example: Lead(Close as predicted 10 days ago, 10).
- Use the rename functionality in NeuroShell Trader to rename chart data series to names that are less than 18 characters because TradeStation® limits the length of names to 18 characters.

NeuroShell Trader has provided the NSTrdImport function in the NST-TS7.ELD, but not the indicator. This is because we have seen TradeStation® not properly plot the results of the indicator (even though they have been received by TradeStation®). We recommend using this with caution. In order to build the indicator you must use the following three lines in EasyLanguage®:

```
Input: Chart("Import Chart"), Ticker("Import Ticker"), Name("Import Name");
Value1 = NSTrdImport(Chart,Ticker,Name);
Plot1( Value1, "NSTrdImport" );
```

In TradeStation®:

1. Select **Indicator** from the **Insert** menu.
2. Select the NSTrdImport Indicator.
3. Check the **Prompt for Format** option if it is not already selected.
4. Press the **OK** button.
5. Select the CHART line and enter the name of the chart you wish to import inside the quotation marks. Include the path with the name of the chart if the chart is not in the default charts directory (i.e. C:\NeuroShell Trader\charts\ directory or equivalent if you didn't install NeuroShell Trader into the default directory).
6. Select the TICKER line and enter the name of ticker that you wish to import inside the quotation marks.
7. Select the NAME line and enter the name of the line that you wish to import inside the quotation marks.
8. Press the **OK** button.
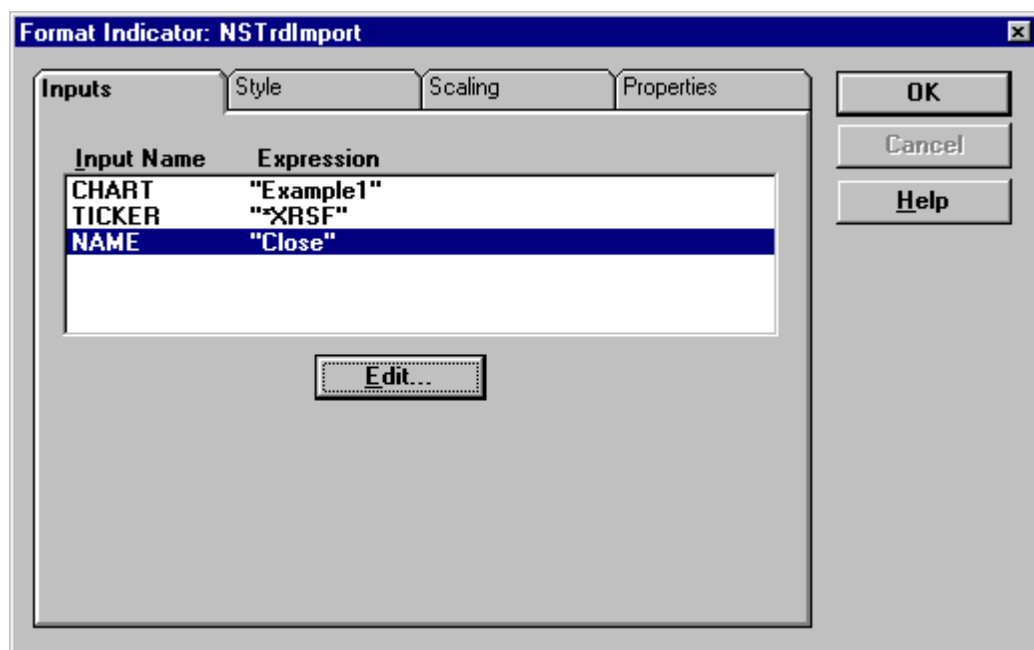
Notes:

- Additionally, you may use the NSTrdImport function in any fashion you desire (another Indicator, Show Me study, PaintBar study, or Trading System). The NSTrdImport function has exactly the same parameters as the indicator (shown above).

- You do not need to export from TradeStation® to NeuroShell Trader in order to import from NeuroShell Trader into TradeStation®. For example, you could simply import data from one of the NeuroShell Trader examples even though they were not created using data exported from TradeStation®.

- You do not need to have NeuroShell Trader running when you export data from TradeStation® or when you import data into TradeStation®.

- When you receive new data in TradeStation® the NSTrdExport and NSTrdImport indicators are automatically recalculated every time you load the chart in TradeStation®, so you don't need to import or export data every time you receive new data.

- Only the most recent 5000 points (approximately 20 years, depending on your data) will be imported into TradeStation®. The remainder will not be shown or able to be used in TradeStation®.

TradeStation®, EasyLanguage®, and PowerEditor® are registered Trademarks of TradeStation Technologies, Inc. **Neither TradeStation Technologies nor any of its affiliates has reviewed, certified, endorsed, approved, disapproved or recommended, and neither does or will review, certify, endorse, approve, disapprove or recommend, any trading software tool that is designed to be compatible with TradeStation Open Platform.**

Topics of Interest:
Installing indicators and functions into TradeStation®
Importing TradeStation® Data and Indicators

Troubleshooting Your Model - What to Do if You Feel You Haven't Been Successful

Understand What it Takes to Succeed

The first thing you must appreciate is that successful financial models (i.e., those that consistently make money) are not easy; if they were, there would be an awful lot of rich people. If you have been at it less than two months, then you may just be scratching the surface so far. Most of our users who have become successful have taken much more time than that, some as much as a year before they are happy with the returns they can produce. Frankly, some of our users never get there, but we can say with certainty that the unsuccessful ones are usually those who feel one should be able to be very rich with little effort, and they do not persist.

Understand Success

Remember that neural nets are not magic; they are excellent modeling tools. Furthermore, financial markets are driven by a myriad of complex variables that are frequently changing. It is therefore quite unreasonable to expect that any model you build will be 100% right 100% of the time, or anything even approaching that goal. You will be successful if you can build some models that make money most of the time. At various times you will have winning trades on some issues, and losing trades on others, but you should try to find a strategy that plays the odds with several models or at least several issues you are trading. The idea is to build a system that makes more money on average than it loses, that doesn't take any large losses, and that does better than you can do trading with your own brain's neural networks. More on this later.

Understand the Background

You should view and review our Tutorial. If you are like most of us, you just skimmed over it and the videos because you were excited to get started with the program. Now it's time to study them carefully, because there are some good tips in the dialog. The financial models that we built on the videos are very typical of the types of models you can build for yourself.

Have you carefully gone over our examples? The models that we built were successful when we built them and were very typical of how successful models are built. There are also good suggestions in the text. Perhaps you downloaded additional data and discovered that these models are no longer profitable, and you've therefore dismissed them? You shouldn't have! Very few people have built technical models of any type that continue to be profitable throughout the life of an issue, or in different market conditions. If a model works for you for six months, you are very lucky. Even neural nets need to be retrained, and even new indicators may need to be found as market forces change. Expect that.

Have you visited our tech support and advanced user web site yet? We aren't talking about our sales site. We're talking about www.ward.net/. You'll need your serial number to log in. (Your serial number is on the back of the folder your installation CD arrived in.) There are a number of valuable tips and techniques there that will help you with you trading and profiting with the NeuroShell Trader. We modify it frequently, and it also contains news about new releases as soon as we make that information available anywhere.
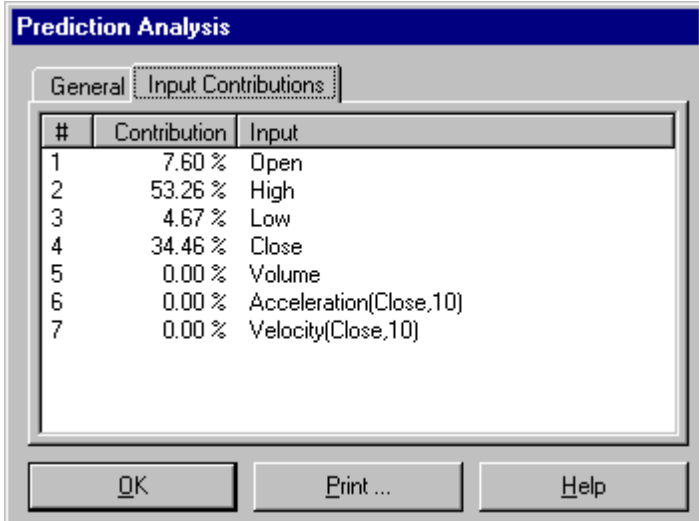
In our training videos, examples, and on our technical support web site we have been repeating a common theme: not all stock or other issues are easy to predict. Some are much harder than others. The biggest mistake you can make is "beating an issue to death." If you are not able to predict your favorite issue after a while, let it go. It's a big market, and there are a lot of ways to make money. Find something else that's easier to predict. Often that something else is less glamorous, but do you really care if you make money?

If you are using neural nets, there are thousands of possible indicators and other functions you could use as inputs to your networks, as you no doubt now realize. The winners at this game are those persistent enough to find good input variables. One of the more successful users of our neural nets is able to predict the S&P by using only ratios! No complicated indicators at all! Of course, if you have a good deal of market savvy to begin with, you may not have to rely on persistence as much. Use your own intuition and feeling about what must be driving the issues you are trying to predict.

On the other hand, there are some standard technical indicators that have worked very well for us at Ward Systems Group and many of our customers. We talk about them in our videos, in our examples, and on our tech support and advanced user web site www.ward.net/. Start with these; don't beat your favorite indicators to death either.

While we're on the subject of inputs to a neural net, let's don't forget over fitting: making a model that works well when it is being built with known answers, but which becomes unprofitable with new "out of sample" data, or in trading. The biggest mistake made by users of both neural nets and other modeling techniques is to use too many inputs. That is the easiest way we know of to promote over fitting, even with our own Turboprop 2. You'll notice that most of our models only use about 5 inputs. Have you used dozens of inputs to your neural nets?

If you have the NeuroShell Trader Professional, you can use the genetic algorithm to help you find a few good inputs. You can also make good use of the Input Contributions screen that you can select after pressing the Prediction Analysis button that appears after training. The neural network is able to estimate how important it found each of the input variables to be during training of the model. Use this as a guide to help you decide amongst many possible input variables. The NeuroShell Professional Trader will expand this capability with genetic algorithms and other automatic optimization techniques.

In the figure above, the input analysis shows that only the high and close were used by the neural net to any significant degree. The inputs with contributions of 0% above can definitely be removed, and possibly even the low with a percentage under 5%.

More on Pattern Recognition; The Key to Success

Neural networks are pattern recognition devices. They associate output predictions with patterns that they find in the inputs. In other words, they make predictions about the future based on what happened in the past when similar input patterns occurred. This simple, but fundamental, fact is all you will ever have to know about neural networks to make them work for you. If there is any one key to success, knowing this is the key. Even neural network experts forget this fact quickly when they attempt to predict financial markets. In fact, neural network experts rarely succeed at this game! The real success stories are made by users who know something about the market, because these people can concentrate on what the market has done before instead of dwelling on red herring neural network internals.

So what does pattern recognition mean to you?

The Holy Grail: *You must give neural networks input patterns during training that will repeat in the future. Furthermore, when these patterns repeat in the future, the price movement that follows (i.e., the output) should be like the price movements that followed these same patterns when they occurred in the past.*

If you can do this, you will make good models. If not, you will not make good models. It is a fundamentally simple concept, but one that is difficult to achieve in practice. But it is literally all you need to do to be a success, because that is the way neural networks and pattern recognition algorithms operate.

Of course, neural nets can still do a good job even it the patterns in the past are similar; they don't have to be identical. The same is true about following price movements – they need not be identical. That is because neural nets are good fuzzy pattern recognizers.

Practical Suggestions

So what can you do to take advantage of the Holy Grail, now that you have found out what it is? There's the obvious, of course: find variables that affect the price movements. This is daunting, so fortunately, there are some things you can do to increase your chances of success:

Try picking issues to model that are somewhat volatile or cyclic. If the price movements don't repeat, there is no chance that your repeating patterns will result in repeating price movements. This can be a little difficult in a sustained bull market.

Don't pick issues that are driven primarily by fundamental variables if you are using technical variables. As an example, look at IBM stock from the period September 1987 to January 1997. During that period Big Blue stock tumbled from over $170 down to

the low $40 range as doubts about its ability to compete w ere rampant. Later in the same period the price climbed back up as IBM restructured, reorganized, dow nsized, and started to show the w orld it w as still going to be a major force in computing. The big bull market didn't hurt the rise, either.

Don't go back too far in time if doing so is likely to mean the input patterns found during training w ill be substantially different from those show ing up today. Even if you have great inputs that are normalized over time, it is likely that as markets change, so does the effectiveness of your input variables.

IBM stock was probably driven strongly by fundamental factors during the period shown above. Predicting the stock except for very short term may require more than technical factors.

A related issue is expecting your neural net, or other model, to backtest (or w alk-forw ard) profitably a long period of time. We think that is very unrealistic. If it w ould have w orked profitably over the last year, w e think that's probably enough. It may not be perfect, but it's probably good enough to trade. Don't insist on the perfect w ave before you surf, or you may never get w et! Sure you'll w ipe out sometimes, but at least you'll be learning to ride the w aves.

More on the Odds – Don't Put all of Your Eggs in One Basket

We mentioned earlier that it is effective to use multiple issues or multiple models. Below are some w ays that can be accomplished. Your trading strategy (how you trade w ith your models) may be as important as the models themselves.

We know that no model w ill be perfect in the financial arena. For some issues it w ill w ork, and for some it w ill not. It may even be the case that the issues it w orks w ell w ith w ill not be consistently the same. Fortunately, the NeuroShell Trader has a feature w herein you only need to build your indicators and predictions once to apply them to a w hole series of your favorite issues. You just place these issues in different pages of the same chart. Then on a given day, adopt a trading strategy like purchasing the top 10% as predicted by the model, and selling the bottom 10%.

Design a trading strategy that does not depend on one model, even for a given issue. The NeuroShell Trader is the best vehicle ever invented for pursuing strategies w ith multiple models. The pow er is there, use it! You use it by building indicators that query multiple predictions built differently, and using those indicators in your trading strategies. These strategies could be as simple as buying only w hen tw o out of three predictions indicate a price rise.

In the strategy above, we execute a long order when two of three models (predictions) are predicting a rise.

When using multiple models, as in 2 above, remember that all models need not be neural. If you have some winning buy/sell indicators you have previously constructed by traditional means, include them in your trading strategy as well. Remember also that your indicator that evaluates several models CAN be neural. You can build a neural network that makes an overall decision based on inputs that are the predictions of several other models!

In this prediction, the inputs will be three previous predictions.

Perhaps now you may have seen that your model may not be all that bad, and may be an effective part of a multiple model total solution.

Using the NeuroShell Trader Professional Successfully

The NeuroShell Trader Professional is highly recommended, but it is not a silver bullet! It has be a lot of fantastic features with which you can experiment. However, you shouldn't just throw "everything but the kitchen sink" at it and expect immediate gratification in the form of fantastic out of sample predictions. Although that works sometimes, it often does not.

As a powerful optimizer, the NeuroShell Trader Professional can, with very little effort, build highly over-fit models much easier

than you can do it yourself! They will look great in sample, but fall apart out of sample and during later trading. Also, even genetic algorithms can take a great deal of time optimizing with too many variables. For these reasons, you must be professional enough to recognize that powerful optimizers can do this, and professional enough to experiment and take steps to avoid over-fitting.

Among the suggestions we have relative to the above are:

- Start with pretty good models and use optimization to make modest improvements to them. Search only a little on either side of the indicator parameters that are presently being used.
- Make sure you stick to a very few inputs to neural nets (usually about 5). When finding an optimum set of inputs, tell the optimizer to use at most 5 inputs.
- Make sure that you do out of sample testing when you optimize trading strategies.
- Experiment with stopping optimization not long after it has begun to avoid over optimizing.
- When optimizing neural nets, consider optimizing on out of sample evaluation sets instead of the oldest walk-forward training set. (But don't go back too far in time when the market was different.)
- Consider and experiment with optimizing neural nets or trading strategies, but not both in the same trading system.
- When optimizing neural nets, use very few hidden neurons. This will not only help prevent over-fitting, but will keep it from taking forever to optimize.
- Use different objective (fitness) functions when optimizing. These can make all the difference in the world. We are providing plenty and considering offering more in the future. Unfortunately, there are no rules on when to use which ones.

The NeuroShell Trader Professional is a power tool, and like most power tools, it can help you but only if used properly and carefully.

You'll Never be Finished

We're sorry to tell you this. Once you start making money with neural networks and the NeuroShell Trader, you will want to keep on improving your models and trading strategies, especially since the market is changing all the time. If you are not doing it full time now, you probably will be some day. We know this because we know traders who make $millions with neural nets, and they are just as active as they ever were in trying new theories and models, if not more so. Fortunately, most of us look forward to the day when we can spend full time trading. So let's get started!

Note to Writers and Would-be Writers

Frequently Asked Questions

Q. The data that I downloaded from Quote.com, eSignal, or Prophet.net is incorrect, missing or corrupt data. How do I fix this problem?

A. In order to correct these problems you will need to manually delete files that the NeuroShell Trader downloads and stores in the \Servers\Data directory. To do this unload any charts that you believe have incorrect, missing or corrupt data, use the Windows Explorer to delete the ticker file associated with the bad data (for Yahoo – 1 minute data the filename is YHOO.1 min.wsg), then reload the chart (this will redownload the data from Quote.com).

Q. Why can't NeuroShell Trader find my AIQ data?

A. In order for NeuroShell Trader to map AIQ data you must use the Data Sources Dialog to add the directory that contains the master.ndx and master.adf files. If you are having difficulty mapping or using your AIQ data you may consider using the "Rebuild Master List" functionality in your AIQ product. Please note that NeuroShell Trader is unable to read data from AIQ's data CD.

Q. How do I import my data files?

A. First, you must make sure that your data files are in the proper format. The NeuroShell Trader reads text files with the following extensions: *.txt, *.csv, *.prn, and *.asc. It also reads MetaStock, and AIQ. Once you have verified that your data is in the proper format, open the NeuroShell Trader, select Data Sources from the Tools menu, and select the Directories/Files tab. Then click on the Add Directory button. Browse to locate the correct directory and hit OK. Note that the NeuroShell Trader automatically assigns a category but you can change this category if you wish by clicking on the Change Category button after highlighting the directory name you wish to change.

Q. Does the NeuroShell Trader perform optimization of inputs?

A. No, it does not. However, the NeuroShell Trader Professional and NeuroShell DayTrader Professional have a genetic optimizer that assists in the selection of inputs and indicator parameters. On the other hand, after you have trained a net, you can see how important each input was to the net. Just select Detailed Analysis on the final Training Wizard screen (before you hit the Finish button). Then choose the Input Contributions tab.

Q. Can I build my own custom indicators in the NeuroShell Trader?

A. Yes. The NeuroShell Trader comes with built-in functions that you can use to create your own custom indicator. These functions are found in the Indicator Wizard under the following categories: Arithmetic, Boolean, Rules, Trigonometric, and Relational. You can create your own custom indicator by combining any of these functions together. You can even combine them with the other standard indicators that are already included.

Q. Why can't I add a stock page to my index chart using Edit, Add/Remove Chart Pages?

A. You cannot create stock pages in an index chart or vice versa. This was designed like this because someone might try to add an index page to a stock chart that has indicators on it that are only applicable to stocks. All of the pages in your NeuroShell Trader chart must be constructed from data streams in the same category.

Q. How is the profit calculated in the Train by Profit mode of training?

A. The profit is calculated in the form of a percent return for each trade. For the long side (sell side works the same way), the NeuroShell Trader will buy when the prediction is greater than your buy long threshold and hold the position until the prediction drops below your exit long threshold. Percent return for that trade is then calculated by dividing the point total made in the trade by the security's value at trade entry. For example, if you bought IBM at 120, stayed long for 10 days, and then exited at 130 your profit would be:

10 (points made) / 120 (initial security value) = 8.33%

When Training by Profit, the NeuroShell Trader will try to maximize the sum of the percent returns for each trade. The profit figures that are listed on the Training Results screen are annualized figures.

Q. Can I change the periodicity of my chart (from daily to weekly or monthly or (DayTrader Only) from 5 minute bars to 10 minute bars)?

A. Yes, you can do this when you first create the chart or after the chart is displayed. The Chart Wizard will ask you if you want the chart to be in daily, weekly, monthly (DayTrader Only) or intraday format. Once you have created a chart, you can change it to a different periodicity by using the frequency drop down box located at the top of the chart. Note that any predictions and trading strategies on the chart will need to be retrained and rebacktested every time you change the charts periodicity.

Q. How do I actually view the predictions?

A. You can get the predicted value by viewing the data. To do this please see Displaying Data.

Q. Is there a way to evaluate the influence each indicator has on the prediction?

A. Yes, after you have trained a net, you can see how important each input was to the net. Just select Detailed Analysis on the final Prediction Wizard screen (before you hit the Finish button). Then choose the Input Contributions tab. Each input will have a number: the higher the number the more important the net found that input to be.

Q. Can the prediction results be printed or recalled to compare with other predictions?

A. Yes, the prediction results can be viewed by selecting the prediction and choosing **Modify Selected Prediction** from the **Edit** menu (or from the right-click). At this point you can print the predictions results from final Prediction Wizard screen by selecting the print button.

Q. After I train a prediction and plot it on my chart, how can I view the training results again?

A. You can access the Training Results screen again by selecting the prediction on your chart (using the right mouse button) and selecting the Modify Selected Prediction option.

Q. How can I delete indicators from the chart or from memory?

A. You can delete indicators from your chart by highlighting them and pressing the delete key. Remember that the NeuroShell Trader stores indicators that are being used in predictions and these can be deleted from your chart (which will clear some memory), but will not be completely deleted from memory until the prediction has been removed. Also, an indicator that is based on other indicators does not require those indicators to be displayed on the chart (in fact it takes up more memory to have them displayed on the chart). Additionally, if any unnecessary indicators hidden from view (check the Hide/Unhide Data screen), you may unhide them and delete them as well.

Q. I cannot see the entire indicator stream because it goes out of the edit window. How can I fix this?

A. You can expand any window to see more of the indicator stream. You do this by placing your mouse in the lower right hand corner of the form screen and wait for the double arrow to appear, then resize the window.

Q. Why do I get 'System Out of Memory' when I try to open a chart of a data file I have on my hard drive?

A. You are probably trying to open the chart by using the Open Chart menu command from the File menu. The Open Chart command lets you browse through folders to find previously saved NeuroShell Trader charts. You cannot directly open a MetaStock, CSI, AIQ, ASCII, or any other type file using the Open Chart command. You first need to add the data directory under Tools - Data Sources and then create a new chart with the Chart Wizard.

Q. Does the NeuroShell Trader automatically splice the NeuroShell Trader CD-ROM with the newly downloaded data from Dial Data?

A. Yes, it does. In fact, NeuroShell Trader will splice together any two data files together as long as they are mapped to the same category and have the same ticker name. You can even splice together price data files and files containing other data such as fundamentals.

Q. What is the difference between the neural nets in NeuroShell 2 and those used in the NeuroShell Trader?

A. TurboProp 2, which is the neural net algorithm used in the NeuroShell Trader, is uniquely different than any of the algorithms in NeuroShell 2. First of all, TurboProp 2 prevents over fitting without using a test set. This means that you can train on all of your historical data without having to hold any out. Second, TurboProp 2 is the result of several years of research and is,

therefore, newer technology than the older neural nets in NeuroShell 2. Third, TurboProp 2 trains much, much faster than many of the neural nets in NeuroShell 2. This means the time it takes you to develop a profitable model will be that much shorter. Finally, Turboprop 2 is much more accurate than any net that has ever built to date (that we know of).

Q. What is an acceptable range for the Training and Evaluation Average Error figures?

A. There is no particular range. This number will vary depending on what you are trying to predict. The real question is, can you make money on the predictions? As our profit based training will illustrate, you don't have to get good predictions at all as long is the direction is mostly right.

Q. When a normalization technique is used in the prediction, such as the percent change in price, is this technique applied to all the instruments and indicators in the study?

A. No, this is only applied to the value you are trying to predict. This normalization technique does not apply to indicators or inputs that will be used to make that prediction. If you want to use inter-market analysis and would like to include the price of another market as an input to your prediction, then it is a good idea to add it's percent change rather than its raw data value. The algorithm does scale all of your inputs and does some normalizing for you, but you will probably have a better model if you use technical indicators to pre-process your raw data.

Q. When a network has been trained, can the resulting analysis be applied to new data without re-training? How is this done?

A. Yes, after you have trained a net, it will automatically be applied to any new data that is added to your chart. For example, if you download your data every day in MetaStock format and train a net on one of those files, then new predictions will be made whenever the data for that chart is updated.

Q. Is the NeuroShell Trader capable of using a prediction to generate buy/sell signals on new data?

A. Yes, you can create buy/sell signals by applying an indicator to your prediction. For example, your indictor could be something like 'If prediction > .5 then 1 else 0'. This would result in a binary 1 or 0 buy/sell indicator being plotted. Or you could decide to train the net to produce a 1 or a 0 (or 1 , -1).

Q. Why is it that when I compared the predictions from the NeuroShell Trader with an older back propagation neural net and found that accuracy of the nets was about the same?

A. Neural nets are the best modeling tools available, and the new Turboprop2 is far superior for most problems than backpropagation. However, no modeling tool can perform any better if it is given poor inputs. The old saying, "Garbage In, Garbage Out" rings true. Predicting the stock market with technical indicators is a very difficult process (if it weren't, there would be thousands of rich neural net users). The reason the stock market is so difficult is that there are literally millions of possible variables that can be used for each of the millions of combinations of output types. We have one customer who earned a 300 percent return last year in actual daily trading by predicting things like the S&P, but he didn't get there by just feeding open, high, low, close, and volume into his nets. He did a lot of work experimenting and using his own savvy to arrive at appropriate things (LEADING indicators) to feed his models. Neural nets are not magic; they are simply great modeling tools. You have to feed them things that are predictive. To see that this is true, just feed one of your nets the output as an input and you will suddenly see it nail the answer. If you have the right inputs, you will get good outputs. If you don't, no modeling tool can make it happen. It takes time.

Q. How do I create a network that will learn to generate trading signals under specific conditions?

A. You can do this by first creating an indicator that outputs a 1 for a buy or a -1 for a sell and choose it as the value you are trying to predict. Using IF THEN rules, you can build the indicator to sense the specific conditions in which you are interested.

Q. When simulating a market order, does the trading strategy take into account whether the opening price is at the bid or the ask price?

A. When simulating a market order, a trading strategy only uses the next bars opening price and does not take into consideration whether the opening price was at the bid or ask. If you set slippage to the expected average bid/ask spread, the entry and exit prices will be adjusted as if the opening price was at the opposite side of the bid ask spread as the entry or exit would occur.

Q. When I export data to a file, only the date and the actual price values are showing up. What am I doing wrong?

A. When you go to export data items to a file, it will ask you to add the items you want to export. Make sure you select 'Out of sample: Predicted … ' or whatever value you would like to export to file.

Q. How do I use the neural net prediction once I have developed it?

A. The nets are automatically applied to your chart when you add more data. All you have to do is add data to the files (new dates). Then when you load the chart, you just scroll over to the right side and view the new predictions. You can view the data by Displaying Data. Additionally, you can build a trading strategy based upon your prediction by selecting Trading Strategy from the Insert menu. This will allow you to place trading points on your graph using rules similar to the following:

If prediction > x then buy long
If prediction < -x then sell long

Q. When I add new data to my chart, do I have to re-train the neural net?

A. No. Once you have trained a neural net prediction and applied it to your chart, it will generate new predictions every time your chart is updated with new data. The prediction becomes just like another indicator, only a leading one rather than a lagging one. At some point, you may want to re-train your neural net. We have some users that re-train every six months, other retrain every two weeks. It all depends on the robustness of your model and the market you are trying to predict.

Q. When I load a text file that I created, why does the NeuroShell Trader only plot one of my data streams?

A. You can insert other variables from your data file by choosing Existing Data/Calculations from the Insert Menu. This will allow you to insert other variables from your data file. It is important to remember that every column in your data file must have a label row, which will enable you to plot the right value.

Q. How can I use logarithms to normalize data?

A. You can do this by applying the Log indicator to your data before you add it as an input to your prediction. The Log indicator is found in the Arithmetic category.

Q. Why do I get an error when I try to open MetaStock, CSI, AIQ or ASCII files?

A. You are probably trying to open the file by using the Open Chart command from the File menu. The Open Chart command lets you browse through folders to fine previously saved NeuroShell Trader charts. You cannot directly open a MetaStock, CSI, AIQ, or ASCII, or any other type file using the Open Chart command. You first need to add the data directory under Tools, Data Sources and then create a new chart with the Chart Wizard.

Q. When I Auto Scan for data files the program either stops responding or crashes. What do I do?

A. The Auto Scan feature is not always able to locate all of your data files. If you have older or corrupted data files then this could be what is causing the program to stall. To work around the problem, if you know which directories contain your data files, then skip the Auto Scan feature and just add the directories one at a time. If one of those directories is still causing the program to crash, then look in the directory to verify that all of the files are data files and everything looks normal. If you still are having difficulties, then email some or all of the files in that directory to Ward Systems Group Technical Support so the problem can be corrected. Your directory may contain a file that we never ran across in our product testing, so by emailing it to us we can correct the bug that is causing the program to crash.

Q. How can I use the NeuroShell Trader to make predictions on a daily chart several months into the future?

A. You can make predictions 6 weeks, 3 months, and even 6 months in advance on a daily chart. You would just change your **Days Ahead** parameter to be the appropriate number of days. For example, a 6-week prediction on a daily chart is the same as a 30-day prediction (assuming 5 days in a week). A 3-month prediction is a 60-day prediction (assuming 20 days in a month), etc.

Q. I would like to create a prediction and then plug the results in a database. How do I do this?

A. After training, you can export the prediction values for use by another program or database. You can export your trained predictions, indicators, and closing prices to a text file by choosing Export Chart/Data from the Tools menu.

Q. Since I track stocks by groups, is there a way to separate batches into groups for stocks, currencies, and indexes?

A. Yes, you can create a chart for stocks, one for currencies, and one for indexes. Remember that you can add another instrument to a chart by selecting Add/Remove Chart Pages from the Edit menu.

Q. It looks like the program is retraining each time I open the chart or switch to a different page in the chart. Why is this?

A. The software does not retrain the neural net each time you load the chart page. It is just loading the price data into memory and calculating the values for all of the indicators and predictions that are currently on your chart.

Q. How would I build a portfolio of health care stocks and generate new predictions for them each day?

A. You can create a new chart called health care stocks and add multiple stocks to the chart by highlighting them in the selection box. If you already have a chart to which you would like to add additional stocks, then you could just choose Add/Remove Chart Pages from the Edit Menu. Once you have a chart with different pages in it for each health care stock, you would just build a prediction for the one stock and it would automatically be applied to all of the other stocks in the chart. All you will have to do now is open the chart each day after your data has been updated and new predictions will be made for each of the stocks. You can also add buy/sell indicators to make it easier to determine which stocks are predicted to rise or fall.

Q. What is the difference between the 'Prediction' and the 'Prediction Signal'?

A. The 'Prediction' values are displayed on the chart for the bar that they are predicted, where as the 'Prediction Signal' is displayed on the chart for the bar that the prediction was made on. This means that the 'Prediction' will lag the 'Prediction Signal' by the number of periods into the future that you are predicting. Be sure that all inputs to a different Prediction or Trading Strategy are created using the 'Signal' version of the prediction, otherwise your prediction or trading strategy will use values that were predict for today, not for the future.

Q. Why does my prediction just seem to mirror the target price, only it is offset by the number of days in the prediction?

A. Neural nets are great modeling tools, but no model is any better than the inputs you are using to build the model. It sounds like you are trying to predict something like the close and are using the open, high, low, and close as inputs to your prediction. The neural net is unable to find any patterns in the inputs you are giving it, so it is forced to just go with whatever will get it the closest to the prediction. In this case, it is probably the most recent close. If you changed your prediction to include things like fundamental indicators, sentiment indicators, or technical indicators like velocity, acceleration, or Bollinger Band % b you would probably start to get better predictions.

Q. How can I prevent all of the data directories I add from being put in the Miscellaneous Category?

A. When you add a directory into the NeuroShell Trader it is automatically added into the Miscellaneous Category. You can change the category for any directory by choosing Data Sources from the Tools menu, selecting the Directories/Files tab, highlighting the category, and selecting the Change Category button. This brings up a list of all the possible category names that you can use.

Q. Why are there gaps in my prediction or custom indicator where nothing is plotted?

A. Gaps or blank spaces in your prediction or indicator are caused by the NeuroShell Trader not getting all of the inputs it needs to calculate the prediction or indicator. For example, if you have a neural net that makes a prediction on the S&P and uses the Treasury Bonds as an input, a prediction will not be generated on a day when there is no value for the Treasury Bonds. The same is true for an indicator - if your indicator formula uses an input that either returns a null value or is blank for that day, the NeuroShell Trader will plot a blank space on your chart.

Q. What are continuous futures (also called continuous contracts)?

A. Continuous futures are data series that consist of individual futures contracts that are "glued" together. The method that they are glued together by depends on the data source that you are using. The data supplied on the CD-ROM uses the current contract (next contract to expire) until it expires, then starts using data from the next contract to expire, etc. All of the data that is represented this way has a ticker symbol that ends with '1600'. If you were to download a ticker that ended with '1605' from DialData, the continuous contract would vary from the one described above in the following way:

The current contract would be used until 5 days prior to the contract expiring, then starts using data from the next contract to expire until 5 days prior to it expiring, etc. DialData offers a range of values that you can download from '1600' to '1630'.

Q. **Can I access intra-day data from TradeStation®'s real-time server?**

A. Yes, however this must been done using the NSTrdExport indicators from inside TradeStation®. For more information on how to use these functions refer to TradeStation NSTExport Server.

TradeStation® is a registered Trademark of TradeStation Technologies, Inc. **Neither TradeStation Technologies nor any of its affiliates has reviewed, certified, endorsed, approved, disapproved or recommended, and neither does or will review, certify, endorse, approve, disapprove or recommend, any trading software tool that is designed to be compatible with TradeStation Open Platform.**

Q. **What is the difference between "Return on Account" and "Return on Trades"? Which one should be used when comparing to "buy and hold", since they are sometimes so very different?**

A. **Return on Account** is the percentage return over a period of time on your money invested. Another way of saying this is that it is (net profit)/(account size required). Return on Account is very simple and straightforward when considering only one trade, but it can get more complicated if there are several trades at different price levels, as we will see in some examples that follow.

Return on Trades is the cumulative sum of the percentage returns of individual trades. If you make three trades, during which you made 5%, 7%, and 10%, then your Return on Trades is just 5% + 7% + 10% = 22%.

It can be noted here that the percentages 5%, 7%, and 10% above are actually the percentages you'd get if you computed Return on Account separately for each individual trade. However, the Return on Account for the whole series of trades will not be 22% as you will see.

Return on Account is best for comparison with "buy and hold", which is just the percent change in price. If you compare with Return on Trades you may erroneously conclude that you aren't beating buy and hold when you may be. That is because return on Trades looks much worse on a trending stock.

Some examples will make the differences between these figures more clear. For purposes of clarity, we will assume no commissions and no slippage in these examples.

Example 1: You buy 100 shares of a stock at 50 and sell them at 60.

    Return on Account:
    The required account size is 100 shares * $50 = $5000.
    The net profit is = 100 * (60 - 50) = $1000.
    Therefore Return on Account = 1000/5000 = .2 or 20%

    Return on Trades:
    The sum of the trade percentages = 20%
    Therefore Return on Trades = 20%

Example 2: You buy 100 shares of a stock at 50, sell them at 80, repurchase them at 80, and then sell them again at 90.

    Return on Account:
    The required account size is 100 shares * $50 = $5000
    The net profit is = 100 * (80 - 50) + 100 * (90 - 80) = 3000 + 1000 = $4000.
    Therefore Return on Account = 4000/5000 = .8 or 80%

    Return on Trades:
    We compute the percentages individually:
    Trade 1 percentage is 100 * (80 - 50)/(100*50) = 3000/5000 = .6 or 60%.

Trade 2 percentage is 100 * (90 - 80)/(100*80) = 1000/8000 = .125 or 12.5%. Note that the required account size is larger for trade 2, since it cost more to get into the trade.

Therefore Return on Trades = 60% + 12.5% = 72.5%

Example 3: You buy 100 shares of a stock at 50, sell them at 80, repurchase them at 85, and then sell them again at 90.

Note that this is the same as case 2, except that w e repurchased at $85 instead of the $80 at w hich w e last sold the shares. This means that w e had to come up w ith an additional 100*5 = $500 to make the second trade. Therefore, the required account size is now $5000 + $500 = $5500.

Return on Account:

The required account size is $5500

The net profit is = 100 * (80 - 50) + 100 * (90 - 85) = 3000 + 500 = $3500.

Therefore Return on Account = 3500/5500 = .636 or 63.6%

Return on Trades:

We again compute the percentages individually:

Trade 1 percentage is 100 * (80 - 50)/(100*50) = 3000/5000 = .6 or 60% as before.

Trade 2 percentage is 100 * (90 - 85)/(100*85) = 500/8500 = .059 or 5.9%. Note that the required account size is larger for trade 2, since it cost more to get into the trade.

Therefore Return on Trades = 60% + 5.9% = 65.9%

Example 4: You buy 100 shares of a stock at 50, sell them for a loss at 45, repurchase them again after they have risen to 80, and then sell them again at 90.

Note that this is similar to case 3 because w e had to come up w ith an additional $80 - $45 = $35 per share for a total of $3500 to make the second trade. Therefore, the required account size is now $5000 + $3500 = $8500.

Return on Account:

The required account size is $8500

The net profit is = 100 * (45 - 50) + 100 * (90 - 80) = -500 + 1000 = $500.

Therefore Return on Account = 500/8500 = .0588 or 5.88%

Return on Trades:

We again compute the percentages individually:

Trade 1 percentage is 100 * (45 - 50)/(100*50) = -500/5000 = -.1 or -10%.

Trade 2 percentage is 100 * (90 - 80)/(100*80) = 1000/8000 = .125 or 12.5%.

Therefore Return on Trades = -10% + 12.5% = 2.5%

Performance Tips

Below is a list of items that may improve the performance of NeuroShell Trader:

- If you find that everything you do causes your hard disk drive to be accessed, then your system may require more memory to minimize use of the swap file used by the operating system. We recommend that NeuroShell Trader be used with a minimum of 128 megabytes of memory; however, if you are creating complex charts you may require more. For more information on this issue refer to your operating system manual or help file.

- Try to avoid hidden information on your chart. The more information that you have on your chart (hidden or visible) requires more memory, slows NeuroShell Trader down, and produces larger size chart files which in turn causes charts to load slowly. By removing unused hidden data from your chart, you will most likely find that NeuroShell Trader loads and manipulates the chart faster. Note that indicators in your chart used to create other indicators or used as input predictions may no longer be needed and can be deleted without affecting the indicators or predictions that use the indicators.

- Use the Format Chart to limit your chart to dates that are relevant. The more data bars that are displayed on the chart, the slower the operation of the chart.

- Map only the data files / data directories that you use, mapping unnecessary files will require more memory, and slow down NeuroShell Trader. To remove unnecessary files refer to Setting Up Data Directories.

- Purge data that you don't use. Limiting the size of your data files will allow NeuroShell Trader to read the files faster. If you have already limited the dates using Format Chart, then this will only improve performance during loading of files.

- Remove unnecessary programs that run in the background from your startup folder. These files are running in the background when other programs are run and thus NeuroShell Trader must share system resources with these programs. In particular, the FINDFAST program installed by Microsoft Office 97 (which can be run from within Office 97) consumes a lot of system resources at all times and if removed may improve NeuroShell Trader performance.

- Defrag your hard disk. This allows your file system to access your files more quickly.

Tips for Using the DayTrader Successfully (DayTrader Only)

1. In our opinion, some data providers can sometimes be very slow for purposes of loading historical data during market hours. That is why the DayTrader saves historical data once you close a chart. If you later load that chart during market hours, the saved data will be loaded and not downloaded from your data provider. Any data bars since the chart was closed will be added by downloading from your data provider. If you are loading historical data for the first time and you find it slow, try again after market hours (also see tip 11 below).

2. In tip 1, we mentioned that data is reloaded from the disk source when you reload a chart. Here are some additional aspects of this process:

    a. If you load another chart with the same ticker and same bar size (1 minute, 5 minute, etc.), the data will still be loaded from disk if possible. The data is not saved in the chart.

    b. Data is saved in the Data folder of the Servers Folder of the NeuroShell Trader folder. Release 3.0 does not erase old data files. If you are no longer interested in a particular ticker, you may want to delete the data file yourself using the Windows Explorer.

    c. If a new chart requests data older than that saved, the data will have to be entirely downloaded again from your data provider. If not, only the data bars that were created after the data was saved need to be downloaded. All of this is done automatically for you by the DayTrader.

3. Don't load too much intraday data. You obviously don't need as many bars of intraday data as you do daily bars to build good models. Usually 2000 to 4000 bars is plenty. If you use too much data, loading will take a long time, as will many other processes in the DayTrader. Remember, the farther back in time you go, the more you risk building models with ancient history that are not relevant today.

4. When optimizing, turn on the check mark entitled "Don't update chart while optimizing/training" if you are connected to the Internet. If the DayTrader keeps talking to the server, it will consume processing cycles that could be utilized by the optimizer.

5. Note that disconnecting from the server in the DayTrader does NOT disconnect your Internet connection. You must do that yourself in Windows, or else you may stay connected to your Internet Service Provider. If you have a line that costs by the minute, remaining connected could cost you money. Methods of disconnecting vary with the type of line, type of service, etc. Contact your Internet Service Provider if you don't know how to do this.

6. Tip 5 above is especially true if you are optimizing; you don't want to remain connected while optimizing. After optimizing starts, you may want to disconnect your Internet connection. After a few seconds, the DayTrader will tell you that you have been disconnected and ask if you want to reconnect. Say no.

7. Some data providers may not always correct for stock splits or correct for them immediately (contact your data provider for more info on this). Therefore, if you know there has been a stock split, your models may no longer be as accurate. You may have to wait some number of days to obtain more data at the new price level in order to build another good model.

8. There are new options under the Tools menu where you can set the sensitivity of the message that tells you if data has changed and suggests retraining. For example, Quote.com data does change from server to server and day to day slightly, in our opinion.

9. Some indicators (e.g. PCA, or indicators you program in a DLL) may take so long to compute that they may not be appropriate for intraday charts.

10. If you do load data during market hours, and the server or the Internet stops sending data, you can cancel loading of that ticker and whatever data was already loaded may still be used.

11. If you want to see if sluggish performance of the server during market hours is due to your data provider or your Internet Service Provider, bring up the Internet Explorer and see if you can access web pages never before accessed. If that works quickly, the problem is probably not the Internet Service Provider. Please contact your data provider customer support if you feel their servers are not providing historical data fast enough.

12. Don't load too many tickers into the DayTrader at one time, especially if your models take a long time to process and you are using the portfolio view or alerts. If the portfolio view is displayed or alerts are active, then all the models are "recalculated" with the completion of every new bar, otherwise only the current model is "recalculated" with the completion of every new bar. If you have 1 minute bars, and 20 tickers loaded, then 20 models could be recalculated every minute.

13. If you are using Quote.com, eSignal, or Prophet.Net as your Data Server and the ticker that you are looking for is not available please look at Adding New Data Server Ticker Symbols.

14. Occasionally, data that is downloaded from a data provider is incorrect, missing or corrupt data. In order to correct these problems you will need to manually delete files that the NeuroShell Trader downloads and stores in the \Servers\Data directory. To do this unload any charts that you believe have incorrect, missing or corrupt data, use the Windows Explorer to delete the ticker file associated with the bad data (for Yahoo - 1 minute data the filename is YHOO.1 min.wsg), then reload the chart (this will redownload the data from the data provider).

Troubleshooting

If you experiencing a General Protection Fault, you may have a conflict w ith a program that is running in the background. In particular, w e have had some users report that First Aid 95 and First Aid 97 report erroneous General Protection Faults. By turning off First Aid, the NeuroShell Trader runs w ith no problems.

If you are experiencing other errors or problems, then you should run the troubleshooting utility program provided by Ward Systems Group. To run the troubleshooting program, follow the procedure below :

1. Click the **Start** button and choose the **Run** command.
2. In the Open box, type: "<NeuroShell Trader Path>\util\debug", w here <NeuroShell Trader Path> is replaced by the letter of the drive the NeuroShell Trader is installed on follow ed by the path that NeuroShell Trader is installed in (i.e., "c:\NeuroShell Trader\util\debug").
3. Press the **OK** button to start the Debug Utility.
4. Follow the instructions.
5. If you are still unable to solve your problem, please contact Ward Systems Group Technical Support.

Ward Systems Group Technical Support

We are dedicated to providing quality technical support. In fact, our technical support staff has acquired such an outstanding reputation that w e frequently get help requests from people w ho are not entitled to this service. To keep these people from getting in the w ay of providing quality service to legitimate users of our products, **we will always ask for your name and serial number.** Please assist us by understanding that this helps you get the fastest support. The serial number is on the back of your CD case.

Here are the steps you should take to get help:

1. Check the help file. It is quite extensive, and w e have found that it covers 90% of all questions w e are asked about this product.
2. If you are receiving an error message or experiencing other problems w hen running NeuroShell Trader, refer to the Troubleshooting help topic.
3. Check our tech support and advanced user w eb site (for users only). On this page w e w ill be posting reports of bugs, w orkarounds, fixes, frequently asked questions, tips, notice of new releases, and new examples. You w ill need your serial number to log into the product area for this product. The w eb page address is http://w w w .w ard.net/ (This w eb page w ill alw ays be changing, so check it frequently). If you have more than one Internet brow ser or have Internet access but do not have a brow ser, click on Internet Access for information on how to reach our Web site.
4. E-mail or fax us your questions. Be sure to include your name and serial number. We try to answ er all questions w ithin 24 hours (Monday through Friday except US holidays and days of certain company events). **How ever, you must carefully describe the problem you are having.** In particular, copy the exact text of any error message, and exactly w hat you w ere doing w hen you received it. Most people assume w e are familiar w ith the error, but many of them come from Window s. Our e-mail address is support@w ardsystems.com. Our fax number is 301-663-9920. New or alternate addresses may be posted from time to time on our tech support w eb page (see 2. above).
5. Call us on the phone. We w ill ask for your **name** and **serial number**. Please have it ready! Our phone tech support service is open from 9:00 am to 12 noon, and from 1:00 PM to 5:00 PM Eastern Standard time Monday through Friday except US holidays and days of certain company events. The phone number is 301-662-7950. The **most busy** times to call are betw een 11:00 am and 3:00 PM Eastern standard time. The most busy days are Monday and Friday. In the event you call us at a busy time w hen all of our tech support personnel are assisting others, you may hold or call back at a less busy time.
6. You may pay for personal consulting in our office. This service is by appointment only and costs $200 per hour in quarter hour increments.
7. You may pay for consulting or classes in your office. This service is arranged on a case by case basis.

You will get a faster answer to your question if you do the following:

1. Know the exact w ording of any error message that appeared on the screen.
2. Know the NeuroShell Trader release number, w hich is displayed by selecting **About NeuroShell Trader** from the **Help** Menu.
3. Have available the follow ing information about your system:
    a. Hardw are type and model number and amount of memory (RAM) installed.
    b. The release number of Microsoft Window s™ or NT™ that you are using.
    c. Monitor type (VGA, super VGA, etc.)
    d. Netw ork configuration, if any.
    e. Printer manufacturer, type, and model.

Ward Systems Group Sales Department

Ward Systems Group Inc. sales hours are: 8:30 a.m. to 5:30 p.m. Eastern time.

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- **Fax: (301) 663 9920**
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- **World Wide Web: http://www.wardsystems.com/**

Click here to visit our Web site! If your computer has a modem and an Internet browser, you can go directly to the Ward Systems Group home page on the World Wide Web.

If you have more than one Internet browser or have Internet access but do not have a browser, click on Internet Access for information on how to reach our Web site.

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If you have more than one Internet browser or have Internet access but do not have a browser, click on Internet Access for information on how to reach our Web site.

Changes from 1.3 to 1.4

The following are the primary new features in the 1.4 release of the Trader:

A. New chart formatting features have been added. Now you can turn off our automatic Y-Axis (price) scaling, and set your own fixed scale, if you prefer that. You can also make your own custom foreground and background color scheme. To access these new features, go to the Edit menu, then select Format Chart. You can also right-click, then choose Format Chart.
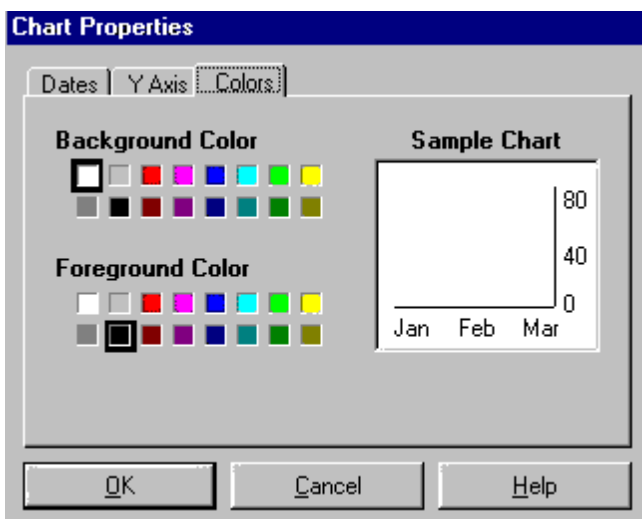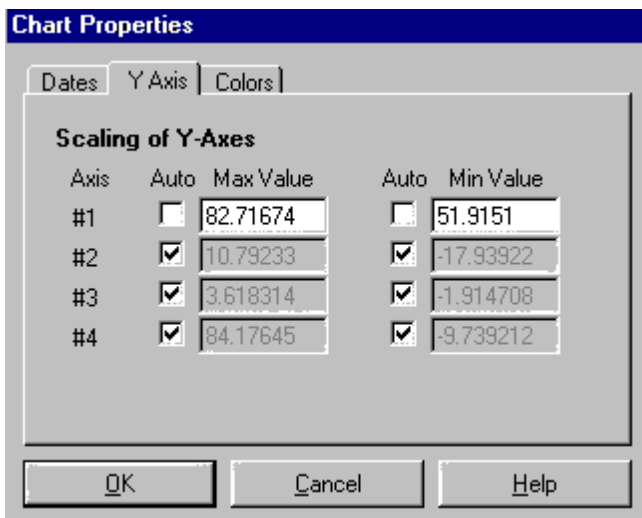
B. Dialog box sizes are now remembered. Once you open one of our dialog boxes to a larger size on your screen, it will stay that size until you change it again. This eliminates the constant resizing of some of these dialog boxes.

C. A new out of sample net or "data stream" has been added when you train a network with walk-forward tests. This is a very powerful and useful feature. The out of sample data stream, which appears in green, essentially "glues together" all of the evaluation periods for all of the walk-forward tests. This means you can see, in one continuous prediction line, how the whole period would be predicted by always using the latest net that did not include the data in the training set. Furthermore, when going forward in time past the current net's training period, this net's prediction uses the current net. This unique net can be used in trading strategies, or in indicators just like either the current net or a walk-forward net. In fact, this is the recommendation so that you will always be seeing out of sample results. In the past, it uses the walk-forward nets, and in the future it uses the current net. In both cases, it is always showing out of sample results.

Since this is so important, we'll try to explain it a different way. Think of this "out of sample net" as a combo net that looks at the date of the inputs. It then uses an appropriate net to make the prediction. The appropriate net is not a net that was trained on this date, because that net has "seen" the answers. The appropriate net is the most recent walk-forward net trained prior to the date of the inputs. For all bars in the future, the current net is the appropriate net. The picture below may help illustrate this.
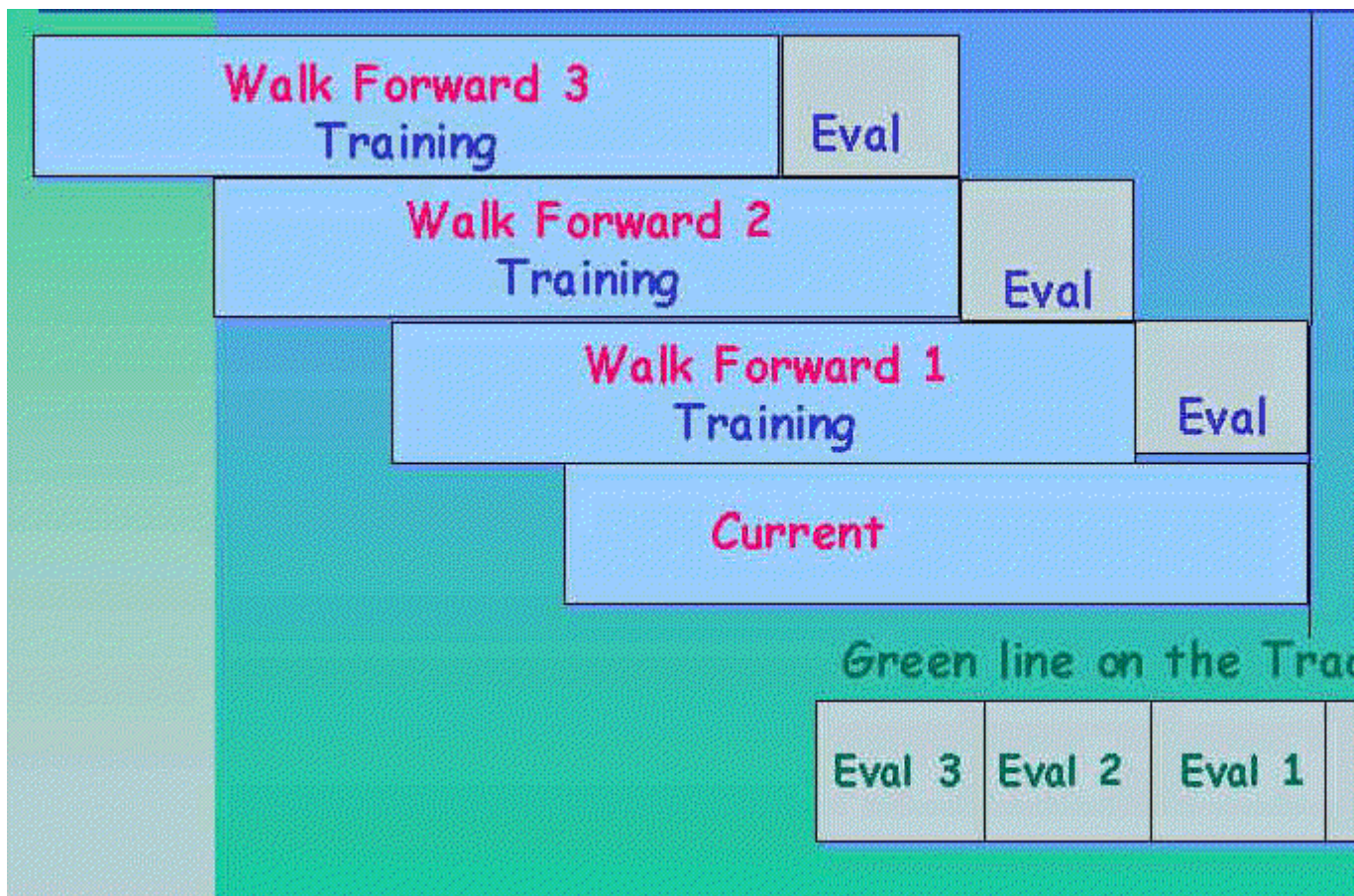
The green out of sample net w ill automatically show up on the chart if you train a completely new net. It is available on old nets you made w ith release 1.3, but you w ill have to insert it on the chart yourself (Insert existing data/calculations).

D. We have added pop-up labels to give the full name of a line on the chart. All you have to do is put the mouse over the chart line or the legend label and the pop-up w indow w ill appear to make the title clear and readable in case the legend is too small.
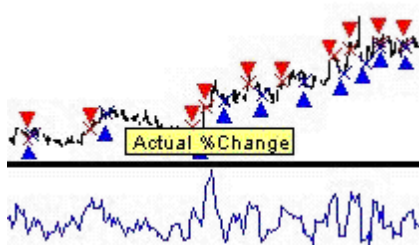
E. It is now possible to edit data files, even the ones on a CD-ROM. To do this, you simply modify a raw data stream (like the close) w ith the right mouse button, just like you w ould modify an indicator, prediction, or trading strategy. (You can also left click and use the edit menu.) A spreadsheet w indow allow s you to make changes to the data. These changes can later be unmodified even, because the changes are stored internally in an override file. It is that feature that makes it possible to modify a CD-ROM file.

F. In the Data Window Mode, the vertical line now has an added horizontal line to make a cross hair. In this mode, you can now do many menu functions that w ere not possible in this mode.
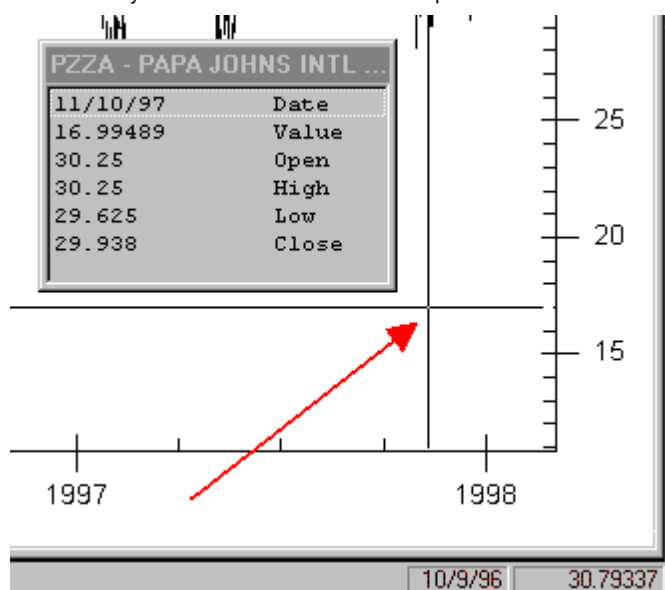
G. On all charts, the current mouse chart coordinates are now displayed on the low er right side of the screen. You can point to any point on the chart and see the date and price level w here the mouse is positioned. Refer to the low er right hand corner of the chart above.

H. Almost a hundred new indicators have been added in these categories:

Basic - (4) - Sum, Multiply, Cumulative Sum, Cumulative Multiply

Statistics - (1) - Standard Normal: Data Point

Arithmetic - (3) - Average2, Average3, Average4

Trading Strategy: Position Information - (13)

Trading Strategy: System Information - (66)

Selective Calculation - (9)

I. The Dial/Data Dow nloader now automatically detects if ticker symbols are in your chart but not your dow nload list, and it w ill automatically add them to the dow nload list if you desire. You can also sort by ticker or name w hen adding a new ticker.

J. We have shortened the nomenclature used for naming predictions. For example, instead of "5 day percent change in close

as predicted 5 days ago" we will now simply use "% change as predicted 5 days ago."

K. The Trader now detects that predictions need retraining or trading strategies need recalculating and so informs the user. The user is told the reason (e.g., the training data has changed) and allows the user the opportunity to do so or ignore the warning. This is done on a page by page basis when a chart page is loaded.

L. There is new sort functionality so that you can sort dialog box column entries just by clicking the column name. This is in the Prediction Wizard, Trading Strategy Wizard (Trade by Trade Analysis and Results screens), and Data Sources Dialog.

M. In the Trading Strategy Wizard, you can now set up to backtest through a certain date instead of selecting a period of time.

N. The NeuroShell Trader now reads CSI data files (downloaded from Commodity Systems, Inc.)

O. The new selective calculation indicator category contains powerful indicators that allow you to include data values in a calculation only if certain conditions are met. For example, suppose you want a moving average, but you only want to include Mondays in the moving average. You would choose the selective moving average and give it as a condition the Monday flag. Or suppose you want to take the minimum low only on up days (when the close is higher than the last day's close). You would choose the selective minimum value of the low, and give it the condition that the close is > the one day lag of the close.

P. On weekly and monthly charts created from daily data, there is now an average volume data series in addition to a volume data series. This is because the volume data series will look much smaller in weeks that have less than 5 days. The average volume may be a better normalized input for a neural net.

Q. On weekly and monthly charts created from daily data, the open interest has been changed so that it now only returns the last open interest value instead of the sum of the open interest across the whole bar. We believe this is a more proper way to calculate open interest on weekly and monthly charts.

R. You can now buy and sell on market close. If you choose market close instead of market, the fill price will be the close of the next day instead of the open for the next day. This is useful for certain types of mutual funds that fill at the next day's close. It also means that it is now possible to buy on market, sell on market close, and have both transactions take place the same day, assuming the buy/sell conditions were met on the same day.

S. With limit, stop, and stop limit orders the price levels are now good for a day. Each day that the entry/exit conditions are met, the limit, stop, or stop limit order is good again for a day. In previous releases, they were essentially good until canceled with no way to cancel them.

T. The Trader now allows a short entry to occur on the same bar as a long exit market order. If the condition for a short entry is true on the same bar that the condition for the long exit market order is true, then the trader will both exit the long position and enter the short position in the next bar. On the graph, the long entry exit triangle (empty downward blue triangle) will not be shown. Only the short entry signal (solid downward red triangle) will be shown for the bar on which the long exit and short entry condition is true.

U. There is now a "Rebacktest" button at the end of the Trading Strategy Wizard. This button now makes modification of a trading strategy work the same way modification of a prediction works. You need to use this button to backtest again if you have made no changes to the trading strategy. (Before you had to modify the strategy, go backwards in the wizard, then go forward again.) If you do make changes, the backtest will run again automatically when you go forward without using the button.

V. The examples have been changed. Examples 1, 2, and 3 are now much more tutorial in nature. Most of the examples on

our www.neuroshell.com/ web page have been updated and added as examples 4 through 9 in release 1.4.1.

W. The buy/sell triangles will now be shown on the trading strategy chart in the space between the day of the signal and the next day (the day the order is filled). Previously they were on top of the day of the signal.

X. The Dial/Data downloader supplied in this release will use Userids that you previously obtained for another program. You are nevertheless asked not to download the same data twice, once from the Trader and once from the other program, since it doubles the workload for Dial/Data.

Y. We have slightly modified some indicators to increase the precision of the calculations internally. The values produced will be slightly different, usually in the 3rd or 4th significant digit, but more accurate. If you retrain any nets using any of these indicators as inputs, there will be slight differences in the results.

In a trading strategy, there is a possibility that small differences in a network's output can make larger differences in profit if those small differences cause a trade to be missed, for example. It is very likely that any charts containing nets using these indicators may now give different results, especially if you retrain the nets..

Below is a list of indicators affected.

SIMPLE MOVING AVERAGE CATEGORY
(All Indicators)

EXPONENTIAL MOVING AVERAGE CATEGORY
(All Indicators)

LINERALY WEIGHTED MOVING AVERAGE CATEGORY
(All Indicators)

VOLUME WEIGHTED MOVING AVERAGE CATEGORY
(All Indicators)

CHANGE CATEGORY
Average Negative Momentum
Average Positive Momentum
Minimum Momentum
Maximum Momentum
Cumulative Negative Momentum
Cumulative Positive Momentum
Cumulative Absolute Momentum

TIME SERIES CATEGORY
Bollinger Band: Low
Bollinger Band: High
Bollinger Band: %B
Bollinger Band: Band Width Percent

PRICE MOMENTUM & PRICE MOMENTUM SMOOTHED CATEGORIES
Commodity Channel Index
Accumulation/Distribution

VOLUME & VOLUME SMOOTHED CATEGORIES
Arms Ease of Movement
Negative Volume Index
On Balance Volume
Positive Volume Index
Volume Accumulation #1
Volume Accumulation #2
Volume Accumulation #3
Volume Life Force
Volume Price Trend

Changes from 1.4 to 2.0

The follow ing are the primary new features in the 2.0 release of the Trader:

A.   New Data View s - There are new data view w indow s that you can select under the View menu. You can turn on one or several view s at a time.
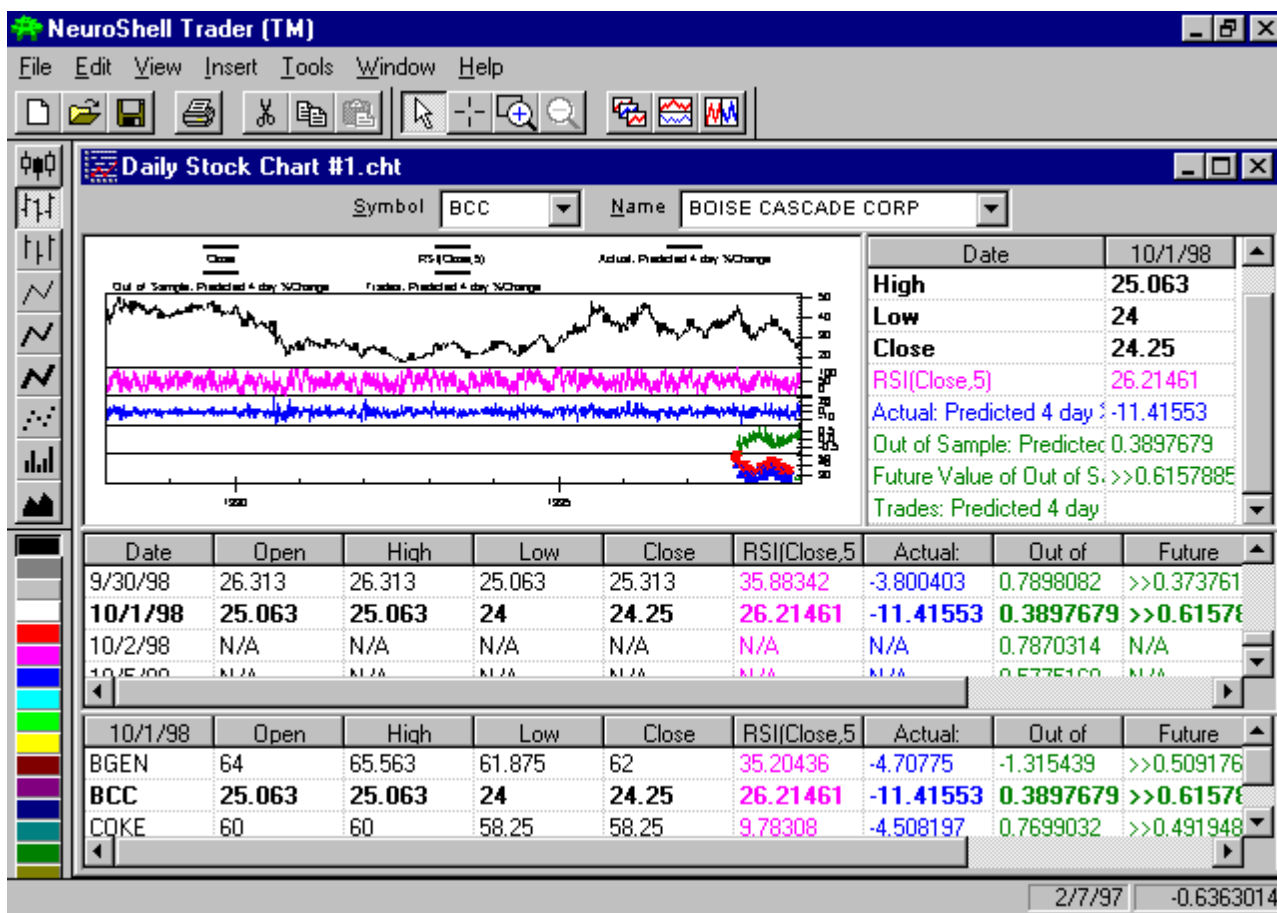
The chart above show s all view s at once. These are the new view s available:

1.   Snapshot view , w hich replaces the old data view w indow . If you click on a data series in the Snapshot view , the chart w ill select/deselect that data series.

2.   Historical view , w hich allow s view ing a historical list of buy/sell signals, predictions, indicators, etc., across the current chart page. If you click on a date in the Historical view w hile in cursor mode, the chart cursor w ill jump to that date.

3.   Portfolio view , w hich allow s view ing buy/sell signals, predictions, indicators, etc., across multiple chart pages. If you click on a ticker or its data in the Portfolio view , the chart changes to that chart page.

B.   Using Custom Indicators - You can use custom indicators that w ill be saved in the Professional product. This allow s NeuroShell Trader "Solution Providers" to create custom indicators and sell or distribute them to ALL NeuroShell Trader users, even if those users don't have the Professional product.

C.   Several New Indicators and Categories

1.   16 Adaptive Moving Average variations added ('Kaufman Adaptive Moving Average' category)

2.   4 new Time Series category indicators: Efficiency, Simple Stochastic %K, Simple Stochastic %D, Simple Stochastic Slow %D

3.   1 new Statistical indicator: Random

4.   5 new Volume category indicators: Money Flow Index, Positive Money Flow , Negative Money Flow , Resistance to Advances, Resistance to Declines

5.   9 new moving average indicators added to appropriate categories: MovAvg Ratio, ExpAvg Ratio, LinWgtAvg Ratio, VolWgtAvg Ratio, VolWgtAvg Offset, VolWgtAvg/Lag(VolWgtAvg) Ratio, VolWgtAvg - Lab(VolWgtAvg), Avg(VolWgtAvg-Lag(VolWgtAvg)), Avg(VolWgtAvg/Lag(VolWsgAvg) Ratio)

6.   Volume Accumulation #3 renamed to William's Variable Accumulation in the Volume Category. Accordingly, all former Volume Accumulation #3 indicators in the Volume:Smoothed Category have been renamed.

7.   2 new Crossover indicators: Stochastic %K/%D Crossover Above, Stochastic %K/%D Crossover Below

8.   Stochastic Crossover Above and Stochastic Crossover Below renamed to Stochastic %K Crossover Above and Stochastic %K Below , respectively

Note that if you used one of the renamed indicators in an old chart, the old chart will still work properly in the new release.

D. New Charting of Predictions by the Prediction Wizard - The Prediction Wizard has been significantly changed regarding the manner in which predictions are displayed. Primarily, since the network can simulate trading during the net training process (even if you train on error minimization), we have modified the program to display the resulting trading information without the necessity of building a trading strategy. You can still build more complicated trading strategies with the Trading Strategy Wizard as usual. As soon as the net is trained, the following are displayed automatically with regard to the period that is the concatenation of all the evaluation periods for all walk-forwards:

1. Full trading statistics and trade-by-trade statistics are displayed in the detailed analysis for predictions.

2. Buy/sell points resulting from the trained out of sample net are now displayed on the graph. These are shown on a separate subgraph with green coloring for the price stream.

3. Prediction results now show a line for the combined out of sample error/profit.

Also, the red current net prediction is no longer shown with the green out of sample prediction line. You can still insert the current net's prediction, or any walk-forward net's prediction, if you want to.
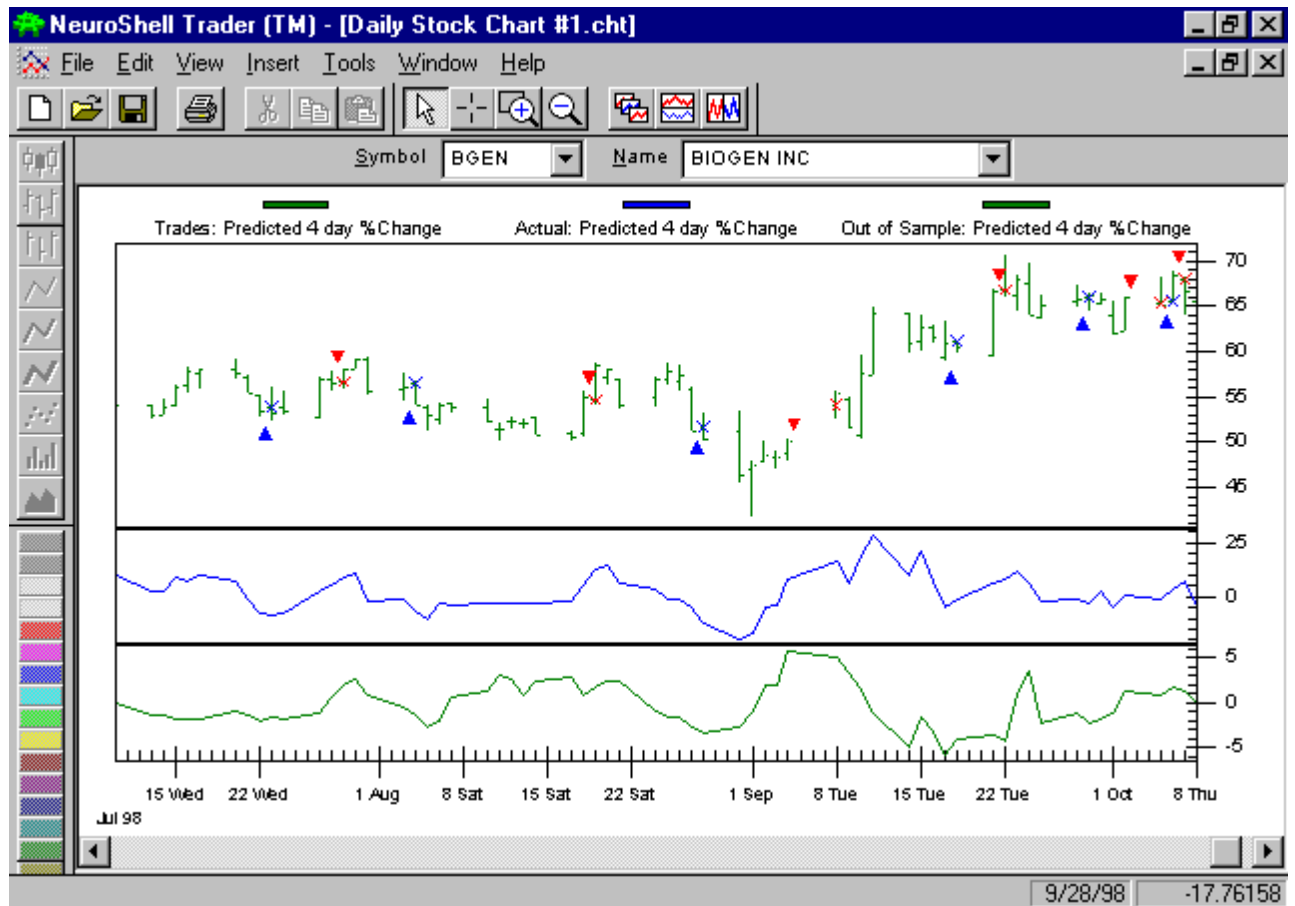
In the chart above, we have just inserted a prediction. The green Trades subgraph was produced by the Prediction Wizard, not the Trading Strategy Wizard (we moved that subgraph to the top so it would be larger).

E. In case you do want to build a trading strategy that matches the Prediction Wizard's results, the following assistance is now available:

1. When you select entry and exit conditions, the conditions the net used during training are already set up and displayed for you to choose (i.e., the relational indicator A>B has already been completed for you).

2. You will have an option to match up trading strategy dates to the out of sample dates for the prediction(s) that were used for the prediction buy/sell signals. This builds a trading strategy that is redundant because you already have buy/sell signals from the net; however, building it may be useful if you want to add more sophistication to the trading strategy.

F. Expandable Parameter Listing for Prediction and Trading Strategy wizards - When you insert an indicator within either the Prediction Wizard or the Trading Strategy Wizard (as opposed to inserting within the Indicator Wizard), you can now modify the parameters of those indicators easier, even if they are deep within embedded indicators. Each such indicator is preceded by a plus (+) sign you can click on. When you click it, the parameters are listed below. Double-clicking on a parameter allows it to quickly be changed. The plus sign will change to a minus sign, which when clicked, hides the parameters previously listed. See below for example.

G. Multiple Selection of Indicators - Now you can go to an indicator category and select several indicators at the same time, and all will be entered at once.

H. TradeStation® 2000i Support - The new Trader automatically recognizes whether it is talking to TradeStation® 4.0 or

2000i, and communicates accordingly.

I. Carry Forward Retraining - This is a new feature we don't think anyone else is doing yet (although we are usually copied!) It is also a feature some of our users have asked for. Previously, you trained a net, used it for awhile in trading, and then retrained at some time in the future. When you retrained, the current net and all walk-forwards moved ahead to the present date, and their back-tested history to the present date wiped out the history that you had with your older net(s). Furthermore, you had to be careful when to switch to the new net, because if you were long in the old net, for example, the new net didn't know that. You had to wait until the old net sold, or adjust the back-test until the new net was long, or something similar, so you could switch to the new net.

Now our Carry Forward Retraining feature makes switching to the new net painless. When you retrain an old net after using it for a while, you will get a dialog box asking you if you want to carry forward, keeping the old net's results. If you say yes, it won't switch you to the new net until you download tomorrow. Furthermore, it remembers whether you were in the market or not and whether you were long or short, and keeps you in that same status on the new net. The old buy/sell points don't change since they're based on the old net still. The next buy or sell signal you get will be from the new net.

J. Nomenclature Changes and the New Options Menu - In previous releases, predictions were charted on the day the prediction would come true, not on the day the prediction was made. This was so that actual and predicted values could both be charted on the day of the actual. Nevertheless, data streams in the Trader used for trading strategies needed the prediction on the day it was made. We used terms like "% Change as predicted 1 day ago" and "% change predicted 1 day into the future" to differentiate these data streams. Some of our users were not comfortable with the predictions plotted when they would come true because they (correctly) think of a prediction as an indicator whose value today is the prediction for x days into the future. Others were perfectly comfortable with our displays, even if they previously used systems that did not "know" about the future. We have therefore given the user control in this release of how these predictions should show up on a chart. We have at the same time renamed predictions to (hopefully) make the concepts clearer and more succinct.

1. In this release there are now "predictions" and "prediction signals". The prediction is what was plotted before, i.e., "% Change as predicted 1 day ago." It is plotted on the day it comes true. Prediction signals are indicators giving you the value today that is predicted for the future, previously "% change predicted 1 day into the future." You get your choice of which one to plot (see 2 below), but the prediction signal is the default. Both can be made available as data streams in the Existing Data/Calculations menu. Only the prediction signal can be used in a trading strategy.

There are three types of predictions, three types of prediction signals, and similar nomenclature for actuals:

Out of sample: 1 day % change

Walk-forward: 1 day % change

Current net: 1 day % change

Actual: 1 day % change

Out of sample signal: 1 day % change

Walk-forward signal: 1 day % change

Current net signal: 1 day % change

Actual signal: 1 day % change

2. We have added an options dialog that is accessible from the 'Tools' menu. This dialog currently allows you to change how a prediction is inserted on the chart. The prediction may be inserted as a prediction signal on the bar the net was fired or as the prediction that extends out into the future. In addition this dialog gives the user control over whether Current nets and Walk-forward nets are displayed in the data lists and whether or not to display the predictions in the data lists (since normally only signals will be needed there for trading strategies.)
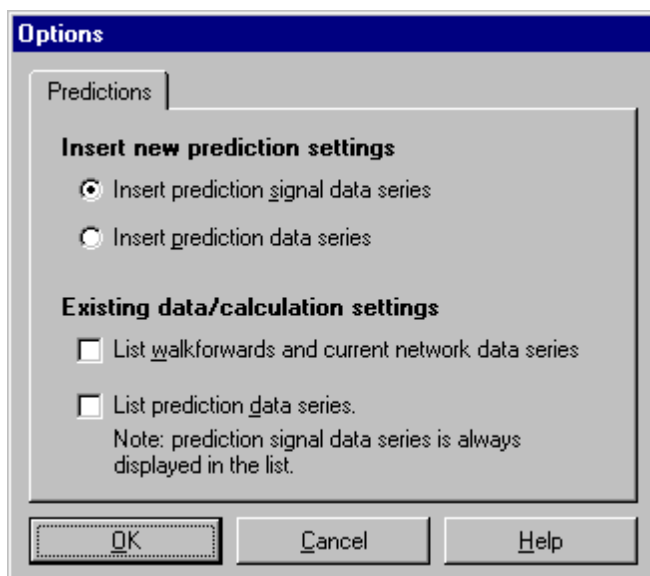
K. Other Minor Prediction Wizard Changes

1. Change in open and %Change in open have replaced Change in close and %Change in close in the list of default prediction outputs. These new outputs compute the change from tomorrow's open to the open x bars beyond tomorrow's open. The prediction enters and exits at the next bar's open, just as actual daily trading would do. Therefore, this will allow for a more realistic prediction. However, Change in Close and %Change in close are still available by selecting Other Data/Indicators.

2. When predicting a custom indicator output, the prediction wizard displays a '...' button that can be used to modify the parameters of the custom indicator output.

3. The prediction profit will be slightly (depending on the trades) different from release 1.4x because that version did not allow a long exit and short entry (or a short exit and a long entry) on the same bar, as release 2.0 does.

L. New Trading Strategy Order Features - Some new trading features have been added. They are somewhat complicated for the beginner and should only be considered by more experienced users.

1. A market on close exit order can exit on the same bar as entry for market, limit, stop, and stop-limit entry orders. Previously, only a market order could exit on the same bar as a close exit order. For example, this allows for very limited day trading: predict the low and use a limit order to enter on the predicted low, while exiting at the close on the same day.

2. The trading strategies now allow a trailing stop reversal trading strategy. If you specify only a long trailing stop and a short trailing stop, the strategy will reverse between long and short positions using trailing stops to enter/exit each position.

3. When using a long/short entry reversal system (i.e. only long and short entry conditions) and stop/limit/stop limit orders, the system now exits with the same type of order as it enters. Previously if the system was long and the short entry condition became true, the system would exit the long position with a market order and place the short entry order with the desired order type (stop/limit/stop limit). Now the system will exit the long position with the same type of order as will be used for the short entry. This eliminates the problem in which there's an exit on the next bar's open, but the entry is some time later that bar or perhaps even an indefinite number of bars later depending upon the limit/stop prices involved.

M. The following trading strategy position indicators have been changed to more accurately reflect their meaning:

1. Bars Since Entry Activated:
   - Parameter has changed from Positions ago to Activations ago (0 Positions ago should now be 1 Activation ago).
   - Values now reflect activations that may not have been filled (i.e., the limit price was never reached), as well as activations that were filled.

2. Bars Since Entry Filled:
   - Parameter has changed from Positions ago to Fills ago (0 positions ago should now be 1 Fill ago).

3. Bars Since Exit Activated:
   - Parameter has changed from Positions ago to Activations ago (0 Positions ago should now be 1 Activation ago).
   - Values now reflect activations that may not have been filled (i.e., the limit price was never reached), as well as activations that were filled.

4. Bars Since Exit Filled:
   - Parameter has changed from Positions ago to Fills ago (0 Positions ago should now be 1 Fill ago).

5. Bars Active:
   - Properly handles reversals - still represents the number of bars active in the current position or any previous position.

6. Bars Filled:
   - Properly handles reversals - still represents the number of bars filled in the current position or any previous position.

7. Value when Entry Activated:
   - Parameter has changed from Positions ago to Activations ago (0 Positions ago should now be 1 Activation ago).
   - Values now reflect activations that may not have been filled (i.e., the limit price was never reached), as well as activations that were filled.

8. Value when Entry Filled:
   - Parameter has changed from Positions ago to Fills ago (0 Positions ago should now be 1 Fill ago).

9. Value when Exit Activated:
   - Parameter has changed from Positions ago to Activations ago (0 Positions ago should now be 1 Activation ago).
   - Values now reflect activations that may not have been filled (i.e., the limit price was never reached), as well as activations that were filled.

10. Value when Exit Filed:
    - Parameter has changed from Positions ago to Fills ago (0 Positions ago should now be 1 Fill ago).

to be compatible with TradeStation Open Platform.

Changes from 2.0 to 3.0

The follow ing are the primary new features in the 3.0 release of the Trader:

A. NeuroShell Trader now has the ability to be upgraded to the NeuroShell DayTrader. This upgrade w ill allow users to use real-time intraday data. For upgrade price and information please contact the Ward Systems Group Sales Department.

B. The dialog for setting up your data directories & files has been combined w ith the dialog to dow nload data. Additionally, w e have added a servers tab to allow you to connect to your real-time data source. This new dialog can be accessed by selecting **Data Sources** from the **Tools** menu.

C. For the new millennium, a new dow nloader from Dial Data has been included. Also, version 3.0 has the ability to read new MetaStock and CSI file formats that some dow nloading services may be using. Furthermore, version 3.0 reads the new data format Omega uses in its files that our TradeStation® interface reads.

D. The daily historical data for Mutual Funds and Market Funds has been moved from the Historical Data CD to the Installation CD. If you w ant to use this data, you can either use it directly from the installation CD or you can copy the needed files to a directory on your hard drive. We suggest that you copy the needed files to your hard drive because if you use this data directly from the installation CD, you w ill be unable to access the Historical Data CD at the same time (unless you have more than one cdrom drive).

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Changes from 3.0 to 3.2

The follow ing are the primary new features in the 3.2 release of the Trader:

A. The capability to change the periodicity of a chart has been added. All charts now have a drop dow n list of periodicities at the top right of the chart. By selecting a different periodicity, all of a chart's data, calculations, predictions, and trading strategies w ill change to the new periodicity. Note that the parameters of indicators, predictions and trading strategies do not change, so if you had MovAvg(Close,5) on a daily chart, the indicator w ill remain as MovAvg(Close,5) if you change to a w eekly chart. The difference w ill be that 5 data points now represent 5 w eeks instead of 5 days. Any predictions and trading strategies on a chart w ill need to be retrained and rebacktested w henever you change the chart periodicity.

B. Analysis templates have been added to NeuroShell Trader. Analysis Templates allow a presaved analysis/chart layout to be applied to a new chart. When creating a new chart, you have the option of selecting an Analysis Template from the Analysis Template drop dow n list. If an analysis template is selected, the chart w ill be created w ith the selected analysis already applied to the chart. For instance, one analysis template you can select is called the Moving Average Crossover Strategy. If selected, a chart w ill be created w ith a moving average crossover based trading strategy on the chart. Any chart file that is saved to the template subdirectory w ill be available as an analysis template in the New Chart Wizard. Therefore, if you w ant to create your ow n custom analysis templates, you need only save or copy a representative chart into the template directory. Custom Analysis Templates are an alternative to multiple chart pages in that they allow you to easily apply the same analysis/chart format to a variety of ticker symbols.

C. (Professional Only) The ability to reconstruct the original indicator from a custom indicator has been added. If you select the **Modify Indicator** button on the last page of the indicator w izard w hen a custom indicator is selected, you w ill see the **Reconstruct Original Indicator** button at the bottom of the Save Template dialog. Pressing this button w ill reconstruct the original indicator that w as used to create the custom indicator. Note that if you have created custom indicators and do not w ant other people to have the ability to view or reconstruct the original indicator, you should make sure that you have passw ord protected all your custom indicators.

D. The prediction w izard has eight new standard outputs. The eight new outputs are the Optimal Change in Close, Optimal Percent Change in Close, Optimal Buy/Sell/Hold based on Close, Optimal Buy/Sell based on Close, Optimal Change in Open, Optimal Percent Change in Open, Optimal Buy/Sell/Hold based on Open, and Optimal Buy/Sell based on Open. The optimal change and optimal percent change outputs are the change from the current price value to the next peak/valley in prices. The buy/sell output is a buy(1) w hen prices are going upw ards tow ards a peak and a sell(-1) w hen prices are going dow nw ards tow ards a peak. The buy/sell/hold indicator is similar to the buy/sell except that it changes from a buy to a hold(0) w hen the distance to the next peak is less than the distance to the valley that follow s the peak. The buy/sell/hold indicator also changes from a sell to a hold w hen the distance to the next valley is less than the distance to the peak that follow s the valley. For more information about these outputs see Neural Netw ork - Output Discussion

E. A new indicator category Neural Outputs has been created and contains the new indicators Optimal Change, Optimal Percent Change, Optimal Buy/Sell/Hold, and Optimal Buy/Sell. These indicators allow users to use the optimal outputs described above as the output for the neural indicators add-on packages.

F. The indicators Time of Day, Hour of Day, and Minute of Hour have been added to the Time Flags category.

G. The indicator Days until Third Friday has been added to the Day and Date Flags category. This w ill aid in determining the number of days until the next options expiration.

H. The indicators Crossover Above and Crossover Below have been added to the Crossover & Breakout Identification category.

I. Double clicking on the legend text or a line on the chart w ill cause an edit of the indicator, prediction, or trading strategy being double clicked. If you prefer, you can still access the modify menu items by right clicking or selecting modify from the edit menu.

J. Exporting has been improved to include the ability to export a data file for each chart page in the chart w ith only one export. The export w izard now contains an **Export a data file for each chart page in the chart** option. This option allow s for a data file to be w ritten for each chart page using the export w izard only once instead of having to use the export w izard once for each chart page for w hich a file is desired.

K. (Professional Only) Four new trading objective functions have been added to both Prediction and Trading Strategy optimization. The new objective functions are Maximize ReturnOnAccount * EquityCurveCorrelation, Maximize Sharpe Ratio by Trade, Maximize Ratio Net Profit / StndDev Profit, and Maximize Ratio Net * Avg Profit / StndDev Profit. For more details on these objective functions see Trading Objective Functions.

L. A quote.com setup dialog has been added to the data sources form. Once you select quote.com as your data server, you can select the **Setup** button to access the setup dialog. The setup dialog contains options for controlling w hether or not NeuroShell Trader tries to automatically reconnect to quote.com if the connection is lost and the option of how to handle situations w here the data on the quote.com server does not match the old quote.com data that NeuroShell trader previously dow nloaded to your hard drive.

M. An option to show **Selected items only** has been added to the Chart Wizard so that selecting and deselecting instruments may be made a little easier w hen creating a new chart or adding/removing chart pages.

N. End of day Omega Global Server data is now mapped as a data server instead of as a data file. The Omega Global Server is mapped as a data server by selecting Data Sources from the Tools menu, selecting the Servers tab, and selecting Omega Global Server (2000i) in the drop dow n list. If you previously had end of day Omega Global Server data mapped, NeuroShell Trader w ill automatically make the Omega Global Server the data server and remove any Omega Global Server

file mappings that you had in prior versions the first time you run NeuroShell Trader version 3.2.

O.   NeuroShell Trader now works on Asian versions of Windows. However, to work with Asian windows it was necessary to change the file format for charts and custom indicators. All charts will automatically be saved to the new file format when they are saved in version 3.2. When you first run version 3.2, all of your template files (.TPL) located in the NeuroShell Trader Template subdirectory will be automatically changed to the new file format. NeuroShell Trader will also save the old template file to the extension .V30. In the event that you need to switch back to the old template format, you can erase the new .TPL file and then rename the old .V30 file to .TPL.

P.   Indicators will now extend data of other frequencies properly. In old versions, if you added weekly raw data to a daily chart, the weekly raw data values would be extended out to fill each daily bar. However, if you had created an indicator based solely upon the weekly data, the resulting indicator would not extend itself out to every daily bar. In the new version, if you create an indicator based solely upon weekly data, the indicator will properly extend itself out to fill every daily bar.

Q.   In the Prediction Wizard, the default number of hidden nodes for the training set was reduced to 10 to match to number of hidden nodes for the optimization set.

R.   Additional Market lists for Quote.com have been added – NASDAQ 100, S&P 500, S&P 100, and Breadthalizer (Quote.com's exclusive market breadth statistics).

Changes from 3.2 to 3.3

Release 3.3 is primarily a maintenance release, how ever the follow ing new features have been added in the 3.3 release of the Trader:

A. Trading Strategies now display a dashed line for all entry and exit limit orders. The dashed line is draw n from just right of the current bar to just left of the future bar for w hich the limit order is active. The line is draw n at the price level for w hich the limit order should be placed. NOTE: To get an old trading strategy w hich uses limit orders to display a dashed line, you w ill need to follow the follow ing steps:

    a. Add "Trading Strategy Long Entry Order" data to your chart using **Insert Existing Data/Calculations** from the **Insert** Menu.

    b. Delete all "Trading Strategy" data from your chart (i.e. all the price/trade annotations for the trading strategy).

    c. Read "Trading Strategy" data from your chart by using **Insert Existing Data/Calculations** from the **Insert** Menu.

    d. Delete the "Trading Strategy Long Entry Order" data you inserted in the first step.

B. Trading Strategies now display a solid line for all entry and exit stop orders. The solid line is draw n from just right of the current bar to just left of the future bar for w hich the stop order is active. The line is draw n at the price level for w hich the stop order should be placed. NOTE: To get an old trading strategy w hich uses stop orders to display a dashed line, you w ill need to follow the same steps as outlined for limit orders above.

C. Quote.com's latest Continuumclient.DLL is now installed. **NOTE: Quote.com's latest DLL w ill disconnect your connection if another user tries to logon to a Quote.com server using the same Name and Password**. Please verify that no one else is using your Quote.com account if you are experiencing substantially more disconnects than you had w ith previous releases.

Changes from 3.3 to 4.0

The following are the major new features added in the 4.0 release of NeuroShell Trader:

Data Source Changes:

A. Quote.com Afterhours – The ability to receive after hours data has been added to the quote.com data feed. An afterhours check box is displayed to the right of the frequency selection drop down list on the chart. Selecting the after hours check box will cause after hours or all markets data to be downloaded and added to the chart. Be careful when using after hours data as the volume in afterhours is usually far less then during normal market hours and therefore might mess up existing predictions and trading strategies.

B. eSignal Data Feed – The ability to receive data from eSignal by selecting the **eSignal Data Server** from the **Server** tab in the Data Sources dialog (select **Data Sources** from the **Tools** menu). For more information on the eSignal server refer to eSignal.

C. eSignal European Market .lst Files – Using the eSignal Data Feed you now have the ability to access European Markets via the eSignal European Market .lst files. These can be selected once you've choosen eSignal Data Feed as your Server. Once that is done you can select the European Markets from the list of markets on the Server tab of the Data Sources dialog.

D. Data Pump Interface – The ability to program custom data interfaces to be used inside the NeuroShell Trader. This interface is quite complicated, but can provide a great deal of power. This feature provides you with a method to "pump" data into the NeuroShell Trader. This allows you to feed any type of data you want from any vendor, with any transformation that you want to perform on the data before NeuroShell Trader looks at the data. This is quite complicated, but it can be done with a decent programmer and information provided in the DataPumpExample.zip available on http://www.ward.net/.

E. DDE Interface – The ability to link to any data stream that uses DDE as a method of providing data. This can be done by using the DDE Archive program provided in the Servers directory. For more information on the DDE Interface visit the Dynamic Data Exchange help file.

F. TradeStation® Intraday Chart Data Transfer – The ability to use TradeStation intraday data realtime. This feature allows users to "export" data and functions from indicators to NeuroShell Trader from TradeStation®. For more information refer to TradeStation NSTExport Server.

G. Adding Ticker Symbols - If you are using Quote.com or eSignal as your data source, you have the option of adding instruments that are not already shown in the New Chart Wizard or the Add Other Instruments Data Wizard. When choosing instruments in each of these wizards, the **Add New Quote.com Ticker Symbol** and the **Add New eSignal Quote.com Ticker Symbol** button will allow you to add new ticker symbols. Use of these buttons allows users to add new ticker symbols dynamically instead of having to manually edit the server .LST files.

H. Combination Ticker Symbols - Ability to create ticker symbols that are simple combinations of ticker prices and use the combination symbol as the primary data series. The optimizations and trading strategies will be based on the ticker symbol combination and results determined on the calculation, not a single ticker symbol. For instance a ticker symbol combination might be [5*YHOO-2.5*INTC+3*MSFT], which would result in a price stream on the chart that is 5*YHOO's price minus 2.5*INTC's price plus 3*MSFT's price. To use this feature, simply create a new ticker symbol like [5*YHOO-2.5*INTC+3*MSFT]. To add a new ticker symbol, use the add ticker button found in the chart wizard when using Quote.com or eSignal. For more information, see Combination Ticker Symbols.

I. DialData Cleanup - The End of Day Download tab in the Data Sources dialog now has the button **DialData Download Reinitialization and Cleanup**. This button can be used if the DialData master file is corrupted and causes errors when adding new tickers to be downloaded or when downloading. Please note that all your previously downloaded data will be removed and the data will be redownloaded next time you download from DialData.

Major Functionality Changes:

A. Adding Ticker Symbols - If you are using Quote.com or eSignal as your data.

B. Wizard Interface Options – Options have been added the Indicator, Prediction and Trading Strategy Wizards to control the complexity of the trading strategy, prediction and indicator wizard interfaces. By selectively turning on only desired interface options, you can customize the interface to show only those trading strategy, prediction, and indicator parameters and options that you will use. With the majority of the interface options turned off, you have a simple and easy to understand interface for creating basic trading strategies, predictions, and indicators. With the majority of the options turned on, you have an extensive interface for creating complex trading strategies, predictions, and indicators. For detailed information on each of the wizard interface option see Trading Strategy Wizard Interface Options, Prediction Wizard Interface Options, and Indicator Wizard Interface Options.

C. Software Copy Protection – The NeuroShell Trader now uses software protection instead of the old security block hardware protection. The software protection is linked to a website which allows for quick enabling and disabling of the software. In the past, to switch computers, you had to move the security block from home to office and back, or to a notebook, etc. Now you can switch computers by simply disabling the NeuroShell Trader on the first computer and then enabling the NeuroShell Trader on the second computer. All of the disabling/enabling is done via the internet. In addition, if you have purchased two copies of NeuroShell, you will be given two activations so that it can be run on two different computers at the same time. For more information see NeuroShell Trader Activation

D. Trading Position and Orders - The alert window has been expanded to include active trading strategies, current market

positions and trading orders for all charts. It now shows lists of the alerts, active trading strategies, current market positions, all trading orders, open trading orders, filled trading orders, and canceled trading orders.

E. Trade Prompting - Trading Strategies now play sound files or show pop-up order messages (for example: Buy 100 Shares of Dell) when a new order is generated. Only active trading strategies will play sound files or show pop-up order messages.

    a. When a new Trading Strategy is added to a chart, it is automatically activated. To deactivate or reactivate a trading strategy, select the **Alerts and Orders Window** menu item from the **View** menu.

    b. To change the sound and pop-up message options, select the **Options** menu item from the **Tools** Menu. If the **Play Sound File** option is selected, then the selected sound will play whenever an active trading strategy generates a trading order. If the **Popup Order Message** option is selected, a pop-up order notification message will appear whenever an active trading strategy generates a trading order.

Chart Related Changes:

A. Adjustable Subgraphs – Subgraph sizes can now be adjusted by dragging the bar separating subgraphs up or down.

B. Improved Legend – The names of data series are now placed at the top of each subgraph instead of all being placed at the top of the graph.

C. Color and Style Dropdowns – The color and style selections have been moved from the vertical toolbar on the left to the drop down menus in the upper toolbar.

D. More colors – A total of 48 color choices are now available for charts.

E. Grid Lines – You can now show vertical or horizontal grid lines on charts. To setup grid lines, select the **Format Chart** menu item from the **Format** menu and then go to the **Colors** tab of the Format Chart dialog.

F. Log scaling – Individual subgraphs of a chart can be scaled logarithmically. To add log scaling, select the **Format Chart** menu item from the **Format** menu and then go to the **Y-Axis** tab of the Format Chart dialog.

G. Expanded window space – For added window/charting space, you can now toggle the display of the status bar, tool bar, and a charts symbol/name/frequency bar using the **Symbol/Name/Frequency Bar**, **Tool Bar**, and **Status Bar** menu items located in the **View** menu.

H. Subgraphs can have more than 2 line styles – The subgraphs can now have more than 2 different lines styles displayed at once. Additionally, more than 1 Candlestick, OHLC, or HLC can be displayed on a single subgraph.

I. First/Last Date Displayed – The first and last date displayed options have been removed from the Format Chart dialog.

Prediction and Trading Strategy related changes:

A. First/Last Date Displayed – The first and last date displayed options have been removed from the Format Chart dialog.

B. Prediction and Trading Strategy Templates – The prediction and trading strategy wizards now allow selection of templates. Templates are preconfigured predictions/strategies that allow you to create a prediction/strategy quickly without having to know or worry about all the details or work of creating one from scratch.

C. Saving Custom Templates – Custom prediction and trading strategy templates can be saved using the **Save as Template** button on the last page of the prediction and trading strategy wizard. Saving custom templates allows you to apply the same prediction or trading strategy analysis to different charts without having to recreate the prediction or trading strategy from scratch.

D. Optimization Parameter Linking (Professional Only) - Parameters can be associated with an optimization link and all parameters associated with the same link will optimize to the same value.

E. Optimization Timeout (Professional Only) - The parameter '**Optimize for exactly**' has been added to predictions and trading strategies. This option forces the optimization to take a specified amount of time. Because of the nature of genetic optimization, it is impossible to determine the exact optimization time or even when the best neural network has been found. Without this parameter selected, optimization will automatically stop after it has decided that a better neural network is unlikely to be found in the future. Set this parameter to a longer to make absolutely sure that the best neural network has been found. Set this parameter to a shorter time to stop optimization before the best neural network has been found.

F. Option to Save Optimal Results that did best on Out of Sample Data (Professional Only) - The parameter '**Generalize on Optimal walk-forwards**' has been added to predictions. This option essentially saves the input and parameter combination that did best on 'out of sample' data. It makes the selection of the optimal neural network based upon performance on the optimal walk-forward out-of-sample data instead of the optimal walk-forward training data. During optimization, the neural network is still trained on the training set, but it is then applied to the optimal walk-forward out-of-sample data. The out-of-sample result is then used to determine the optimal neural network. Note that by using this option, the optimal walk-forward out-of-sample results can no longer be considered truly out-of-sample as the data is being used to determine the best inputs and parameters during optimization.

G. Optimization Across Chart Pages (Professional Only) - The parameter '**Optimize across all chart pages**' has been added to predictions and trading strategies. This option forces the optimization to choose the same inputs and parameters for each chart page. The optimization will find the inputs and parameters that perform best across all chart pages by using the average result across all chart pages instead of trying to optimize the individual results for each chart page. Use of this parameter will result in worse results than optimizing each chart page individually, but will provide more consistent and generalized inputs and parameters across the chart pages.

H. Round Lot Trading – The parameter '**Buy shares in round lot of**' has been added to predictions and trading strategies. When selected, this parameter Rounds down the number of shares traded to a multiple of the specified number of

shares. As an example, if the round lot shares is set to 100 and the number of shares to be traded is 299, then the actual number of shares traded w ill be 200.

I. Option for Entries to Exit Positions – The option **Long/Short entries exit existing short/long positions** has been added to the Trading Strategy Parameters dialog. This option forces an entry signal to automatically exit existing positions. Long positions w ill be exited w hen the short entry condition(s) become true. Likew ise, short positions w ill be exited w hen the long entry condition(s) become true. If you do not select this parameter and you have specified trailing stops and/or exit conditions, then a position w ill be exited only w hen the trailing stops are hit or the exit conditions become true (i.e. the w ay old NeuroShell Trader versions w orked).

J. Predictions Default to In-Sample Optimization (Professional Only) – The prediction w izard now defaults to insample optimization. Out of sample optimization is still available, but must be set in the Prediction Parameters dialog.

K. Minimize w hile processing – A minimize button has been added to the Prediction Wizard and the Trading Strategy Wizard. The button is visible during the training, backtesting, and optimization process. The button w ill minimize the entire NeuroShell Trader w indow so that you can w ork on other programs w hile long processing is taking place. Note that using the **Show Desktop** Window s task bar icon w hich is typically located next to the Window s **Start** button w ill also minimize the Trader during processing.

L. Column Widths Remembered - The columns w idths in the results screen of the Prediction Wizard and the Trading Strategy Wizard are now remembered and restored every time the w izards are run.

Indicator Related Changes:

A. Ability to reorganize Indicator Categories – **Move Up**, **Move Dow n**, and **Reset** buttons have been added to the category page of the indicator w izard. These buttons allow you to change the order in w hich indicator categories are listed. For more information see Indicator Wizard - Selecting a Category.

B. Custom Indicator Optimization Ranges (Professional Only) – When creating custom indicators, you can now specify the default optimization range that should be used for each parameter w hen the custom indicator is optimized. For more information see Modify Parameter's Display Properties (Professional Only)

General Changes:

A. Autosaving of charts – An option has been added that allow s charts to be saved after every major change and before training/backtesting. If the Trader is unexpectedly terminated (pow er outage, system crash, etc), the Trader w ill ask you if you w ould like to load the autosaved chart(s) w hen the first time you rerun the Trader. For more information see Options - Chart.

B. Emailing Charts - An **Email Chart** menu item has been added to the **File** menu. This menu item allow s users to automatically attach their charts to a new email message using their default email client. The option also exists to save the current underlying data in the chart that gets emailed so that email recipients have the same data as w hen the **Email Chart** menu item w as selected. For more information, see Emailing a Chart.

C. Direct Link to w w w .w ard.net. A **Connect to Advanced User's Tips & Techniques Website** menu item has been added to the **Help** menu. This menu item w ill bring up your internet brow ser and load w w w .w ard.net. For more information, see Advanced User's Tips & Techniques Website

Changes from 4.0 to 4.3

The TradeStation Import function is no longer a supported feature, although it is still included in the release. It is unsupported because changes made to TradeStation have rendered the feature unreliable.

Changes from 4.3 to 4.4

The follow ing are the major new features added in the 4.4 release of NeuroShell Trader:

1. Ability to select time zone information for server data:
    a. Select **Tools** – **Data Sources**.
    b. Select the **Servers** tab.
    c. Select the **Setup** button for your selected server.
    d. Select the **Time Zone** tab.

2. Ability to view and delete historical data server files from inside NeuroShell Trader:
    a. Select **Tools** – **Data Sources**.
    b. Select the **Servers** tab.
    c. Select the **Manage Realtime Files** button.

3. The %return calculation w as changed to add the entry commission into the numerator of the %return calculation:

    %Return is calculated as follow s:
    > Long Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (entry price*shares – entry commissions).
    > Short Percent Return = 100 * ((exit price - entry price)*shares - entry commission - exit commission) / (entry price*shares – entry commissions).

    If using margin $ per share/contract, then % return is calculated as follow s:
    > Long Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (margin*contracts – entry commissions)
    > Short Percent Return = 100 * ((entry price - exit price)*shares - entry commission - exit commission) / (margin* contracts – entry commissions)

    Note that the entry and exit price incorporate any specified slippage and/or point value

Changes from 4.4 to 4.5

The follow ing are the major new features added in the 4.5 release of NeuroShell Trader:

1. eSignal recently made 60 days of data available for dow nload (as opposed to 30 days previously). Version 4.5 adds the ability to dow nload 60 days of data from eSignal. and the new 4.5 version of the Trader w ill now dow nload the full 60 days of data.

Changes from 4.6 to 4.7

The follow ing are the major new features added in the 4.7 release of NeuroShell Trader:

1.   Added ability to read ASCII files that are ordered from most recent date at top to least recent date at bottom.

Changes from 4.7 to 4.8

The follow ing are the major new features added in the 4.8 release of NeuroShell Trader:

1. Composite Symbols (i.e. [2*IBM-3*DELL]), now allow quotes around ticker symbols to allow for ticker symbols that contain arithmetic operators like *, -, +, and /. This allow s composite symbols on foreign exchanges of the form ["bl u5-dt"-"gb u5-dt"]

Changes from 4.8 to 5.0

The following are the primary new features in NeuroShell Trader 5.0:

1. **Integrated Trading** – Ability to send trades directly to the brokerage firm Interactive Brokers or email orders to a list of email addresses.   To setup integrated trading within NeuroShell Trader:
    1. Select **Options** from the **Tools** menu to activate the Options Dialog
    2. Select **Send orders to brokerage** from the **Trading Orders** tab
    3. Select the desired brokerage server from the **Brokerage** drop-down list.

    For more detailed information about the brokerage servers available in 5.0, see: Interactive Brokers and Order Emailer

2. **Integrated Trading API** – Integrated trading programmer's interface which will allow programmers to create NeuroShell Trader integrated trading connections to brokerages other than Interactive Brokers. Additional details are available in the Trading API package available from Ward Systems Group.

3. **Range Bar Charts** – Constant range bars can be created where each bar represents trading activity for the user-specified minimum price range. The high-low range of each bar will equal the specified range. Each bar is created by accumulating trades until the high-low range is reached. The first trade to break outside that range starts a new bar. Since price gaps are not filled with phantom bars, the high-low range of a bar can exceed the specified range when prices gap outside the range before a bar's price range criteria was met.

    To create a constant range bar chart, in the New Chart wizard, simply choose 'Range Bars' and then enter the desired amount of price range that will make up each bar (for example price range of 2.5 per bar). Note that range bars are created from tick by tick data streams and therefore historical data may be limited and take longer to load. Additionally, range bars can only be created using Quote.com or eSignal in the 5.0 release.

4. **Volume Bar Charts** – Constant volume bar charts can be created where each bar represents trading activity for the user-specified minimum volume. The volume of each bar will equal the specified volume. Each bar is created by accumulating trades until the specified volume is reached.

    To create a volume bar chart, in the New Chart wizard, simply choose 'Volume Bars' and then enter the desired amount of volume that will make up each bar (for example volume of 10000 shares per bar). Note that volume bars are created from tick by tick data streams and therefore historical data may be limited and take longer to load. Additionally, volume bars can only be created using Quote.com or eSignal in the 5.0 release.

5. **Tick Bar Charts** - Tick bar charts can be created where each bar represents trading activity for the user-specified number of trades. In the New Chart wizard, simply choose 'Tick Bars' and then enter the desired number of ticks that will make up each bar (for example 25 ticks per bar). Note that tick bars are created from tick by tick data streams and therefore historical data may be limited and take a longer to load. Additionally, tick bars can only be created using Quote.com or eSignal in the 5.0 release.

6. **Second Bar Charts** –Second bars can be created. In the New Chart wizard, simply choose 'Second Bars' and then enter the desired number seconds that will make up each bar (10 seconds per bar).). Note that second bars are created from tick by tick data streams and therefore historical data may be limited and take a longer to load. Additionally, second bars can only be created using Quote.com or eSignal in the 5.0 release.

7. **Expanded Minute and Hour Bar Charts** – Minute and Hour bars can now be created with any number of minutes or hours per bar. In the New Chart wizard, simply choose either 'Minute Bars' or 'Hour Bars' and then enter the desired number of minutes or hours that will make up each bar (for example 13 minute bars or 5 hour bars).

8. **Bid and Ask Statistics** – When using any tick by tick data stream based charting method (Second Bars, Tick Bars, Volume Bars and Range Bars), the following bid and ask data streams are created in addition to the standard Open, High, Low, Close and Volume:

Bid	The current bid price at the close of the bar.
Ask	The current ask price at the close of the bar.
Bid Size	The number of shares offered for purchase at the current bid price at the close of the bar.
Ask Size	The number of shares offered for sale at the current ask price at the close of the bar.
# Bid Trades	The number of trades that occurred at the bid price during the last bar.
# Ask Trades	The number of trades that occurred at the ask price during the last bar.
Bid Trade Volume	The total volume of trades that occurred at the bid price during the last bar.
Ask Trade Volume	The total volume of trades that occurred at the ask price during the last bar.

Avg Bid Trade Volume   The average trade volume for trades that occurred at the bid price during the last bar.

Avg Ask Trade Volume   The average trade volume for trades that occurred at the ask price during the last bar.

Note that bid ask statistics may not be available for every ticker symbol. Availability is dependent upon whether the data provider includes current bid/ask ticks in the tick by tick data stream for a given ticker symbol.

9. **Ticker Scanning** – Large numbers of ticker symbols can be scanned for user definable criteria or values. To start ticker symbol scanning wizard, select 'Scan Ticker Symbols' from the 'Tools Menu' and then follow the instructions below :
    1. On the first page of the Ticker Symbol Scanning Wizard, select either a pre-saved scan template or select No Template.
    2. On the second wizard page, select the scanning periodicity (minute bars, hour bars, etc.) and how far back data is loaded for each scan's calculations.
    3. Use the third wizard page to select the category of ticker symbols to be scanned
    4. On the fourth wizard pages, select the actual ticker symbols to be scanned.
    5. On the fifth wizard page, enter all the indicators values that you wish to view for the scanned ticker symbols. The sixth wizard page lists the latest indicator values for each of the selected ticker symbols. You can sort the columns to group indicators with certain indicator values. Any of the ticker symbols that you select/check will be added to a new chart when you press the Finish button. The new chart will also contain all the indicators that were included in the scan.

10. **Workspaces** – Saving and loading of workspaces, which are collections of charts you want to load at the same time. To save a workspace, select the 'Save Workspace' menuitem from the 'File' menu. To load a pre-saved workspace, select 'Open' from the file menu and select a workspace (file name ending in .wrk). Note that the 'Open' dialog displays both charts and workspace files at the same time, but can be changed to display only one or the other using the 'Files of Type' dropdown box at the bottom of the dialog.

11. **Trend, Fibonnaci, Line, Shape and Text Annotations -** Trend lines, trend channels, Fibonacci retracements, Fibonacci projections, Fibonacci time lines, lines, vertical lines, horizontal lines, squares, ellipses, and text can now be drawn on charts.

    To draw annotations on a chart, select the appropriate annotation type from the 'Drawing' menu and then press the left mouse button on the chart where you wish the annotation to start and then drag the mouse with the button still depressed to the ending location of the annotation.

    To edit annotations already on a chart, simply select the annotation with the mouse and left mouse button and either drag the annotation to a new position, resize the annotation using the resize squares at the edges of the annotation, or simply delete the annotation using the delete key or the delete menu item. To change text annotations to different text strings, double click on the text annotation.

12. **Increasing/Decreasing Bar Colors** – Ability to color data series in user selected colors based upon whether the data series is increasing or decreasing. To turn on this feature, select a data series on a chart, choose the "Format Selected …" menu item from the 'Format' menu and make the appropriate changes in the 'Mult-Colored' tab.

13. **Maximum/Minimum Range Bar Colors** – Ability to color data series in user selected colors based upon whether the data has reached a user defined upper range or lower range. To turn on this feature, select a data series on a chart, choose the "Format Selected …" menu item from the 'Format' menu and make the appropriate changes in the 'Mult-Colored' tab.

14. **Gradient Color Bars** – Ability to color data series in a user defined color gradient based upon the bars relative range or relative increase/decrease. To turn on this feature, select a data series on a chart, choose the "Format Selected …" menu item from the 'Format' menu and make the appropriate changes in the 'Mult-Colored' tab.

    The gradient color shading is determined based upon the number of last bars chosen. So for instance if you choose 14 bars, the current bar's color will be chosen based upon its value relative to the values over the last 14 bars. If it is at an extreme min or max, then it will be colored in the appropriate min or max color, otherwise it will be colored in a color shade between the two colors in proportion to its distance from the maximum and minimum value over the last 14 days.

15. **Out Of Sample Model Saving** – Ability to choose whether or not to keep the prediction or trading strategy model that did best on the optimization data set or the model that did best on a subsequent paper trading (i.e. out of sample) data set. Configuration of this feature is done on the dates tab of the prediction parameters and trading strategy parameters dialog.

    If you choose to save the model that does best on subsequent paper trading, the model's parameters are still optimized on the optimization set, but each new optimal solution that is found by the GA is applied to the paper trading set. If that optimal solution is found to get better results on the paper trading set than previous optimal solutions, then it is saved as the 'best model'. Optimal solutions that underperformed on the paper trading are still used in the GA optimization process to find an

optimal solution on the optimal data set, but they are not used as the 'best model'. The final model selected by the optimization is the last saved 'best model'.

The optimization data set show s on the chart and on the date selection dialog in gray bars, and the paper trading set show s in orange bars.

16. **Trading Data Set** – Option to start a 'trading' data set before the last chart date in the prediction and trading strategy w izards for additional statistical analysis of systems. To turn on this option, select the 'Options' menu item from the 'Tools' menu, select the 'Advanced' tab and select 'Allow trading to begin before last chart date'. After this option is turned on, you w ill see the 'Start trading before last chart date' checkbox on the dates tab of the prediction and trading strategy parameters dialog.

By setting this option, the prediction and trading strategy dates interface w ill allow a 'trading' statistics data set to be calculated after the optimization and paper trading data sets. This 'trading' data set w ill be a true "out-of-sample" data set. It can be used if you do not w ish to keep the model that did best on paper trading, but yet you still w ant to see how a model did on data other than the optimization data set. This data set can also be used in conjunction w ith saving the model that did best on subsequent paper trading to evaluate the model and yet another independent data set.

The Trading data set show s on the chart and in the data selection dialog in green bars.

17. **Configurable Results** – The statistics that are displayed in prediction and trading strategy w izard results page can now be selected and the statistics columns reordered. To select w hich statistics are displayed in both w izards, choose the desired statistics from the Results Screen Column section of the w izard options ('options' button) for the prediction and trading strategy w izards. To reorder the statistics columns, simply drag and drop the column headers of the statistics list into the desired order.

18. **Existing Data/Calculations Tree View** – The data in the Existing Data/Calculations dialog is now presented in a tree format that can be expanded dow n unlimited indicator levels.

19. **Simplified Prediction Interface** – The confusing prediction optimal w alkforw ard and w alkforw ard interface of 4.0 has been changed to match the trading strategy date interface. The optimal w alkforw ard and w alkforw ard capabilities of 4.0 are now encapsulated in the 'paper trading' and 'trading' data sets that are selectable from the dates tab of the prediction parameters screen.

20. **Chart Page Indicators** – A Chart Page Calculation indicator category has been added w hich contains the Chart Page Upper Rank, Low er Rank, Percentile, Maximum, Minimum, Sum, Average, Count, Standard Deviation, and Z-Score.

These indicators calculate similar to their normal counterparts except that they calculate the statistics for each date/time across all the chart pages in a chart as opposed to calculating back in time on one ticker symbol. So for instance the Chart Page Average, calculates the average value for each date/time across all the chart pages.

Use these indicators in charts w ith multiple chart pages (i.e. ticker symbols) to compare the current chart page indicators/value w ith all the other chart pages. So for instance you could use the Chart Page Upper Rank indicator to view the rank of each chart page value relative to the other chart pages, as an input to a prediction that indicates how the ticker is performing relative to others, or even as an input to a trading strategy w hich might limit trading to the top 3 tickers w ith the most volume. The possible uses of these indicators is limitless.

21. **Open Chart Multiple Selection** – The Open File dialog now allow s multiple selection of charts.

22. **Save Data in Chart** – The Save As dialog now has a "Save data in chart" checkbox at bottom of the dialog. Turning on this option w ill save the current underlying data w ith in the chart. Upon loading a chart w ith saved data, you have the option of loading w ith the saved data or getting data from the normal sources (data feed, files, …). Use this feature w hen sending charts to other people (especially tech support), w hen you w ant to guarantee they are seeing exactly the same data w ithout differences in files mapped, data feed provider, etc.

23. **Deactivation at Shutdow n Option** - Check box located at the bottom of the activation screen now allow s user to select "Prompt for deactivation at shutdow n of Trader". Use this option if you are frequently running one license on multiple computers, but sometimes forget to deactivate one computer before running the softw are on another computer.

24. **Chart Drag** - Charts can be scrolled left or right by dragging the chart in the desired direction w ith the left mouse button depressed. Note that you must drag a blank portion of the chart, otherw ise the data series or annotation over w hich the mouse cursor is positioned w ill get selected/dragged instead of the chart getting dragged.

25. **Multiple Indicator Colors** – Different indicators are now added to the chart in different colors instead of all the same default indicator color of purple.

26. **Simultaneous Exit Stop and Limit Orders** – Trading Strategies now allow simultaneous exit stop and exit limit orders. This allows for backtesting and trading of strategies that have a simultaneous price target limit order and trailing stop order in the market at the same time.

27. **Stop and Limit Order Rounding** - Limit and Stop order prices are now rounded to the same precision/increment of price stream. Avoids problem of having a limit and stop order calculation that provides a continuous range of values with very small decimal places being placed at a price in between valid price increments for the underlying symbol being traded.

28. **Point Values for each Ticker Symbol** – Point Values for predictions and trading strategies are now entered on a ticker by ticker basis. This allows for backtesting and optimizing of strategies across multiple chart pages, with each chart page having a different point value.

    The point values for each ticker symbol are also saved and remembered for use in future charts, predictions and trading strategies. To change the point values for the current chart pages, press the Point Values button in the Costs tab of a trading strategy or prediction. You can also edit the list of all saved point values using the Point Values tab after selecting the Options menu item on the Tools menu. Note that if charts from old versions of NeuroShell Trader that contain point value specifications are loaded, the point values used in those charts will be automatically set for the appropriate ticker symbols if no point value currently exists for that ticker symbol.

29. **Trading Data Set Recalculates Statistics with Updated Data** – As a chart is updated with more data, a Trading data set is added to both the prediction and trading strategies which allow a user to view the trading statistics, trade by trade, etc. with data going forward since the trading strategy or prediction was last backtested. Each time a trading strategy or prediction is modified when there is new data on the chart, the Trading Strategy Wizard and the Prediction Wizard will recalculate the Trading data set statistics to include the lastest data.

30. **Faster Optimization of Trailing Stop and Exit Indicators** – Protective stop and exit signal indicators now process much faster during optimization of a trading strategy. Note that the speed up will only occur if the indicators are inserted by themselves and not if the indicators are used inside another indicator (for example the trailing stop in Add2(TrailingPriceTarget(…),2) will not process faster). The indicators that optimize faster are:

    Entry Price: Percent Activation
    Entry Price: Point Activation
    Price floor: Percent
    Price floor: Points
    Trailing price: Percent
    Trailing price: Points
    Bars Since Activated = X
    Bars Since Activated >= X
    Bars Since Filled = X
    Bars Since Filled >= X
    Price Target: Percent
    Price Target: Points

31. **Linear Time Regression: Predicted Value and Change** – The Linear Time Regression: Predicted Value and Linear Time Regression: Predicted Change indicators now accept both zero and negative values for the Periods Ahead parameter. This allows these indicators to not only obtain values and changes on the regression line into the future, but also obtain values and changes on the regression line for the current bar (0) and past bars (negative periods ahead).

32. **Renaming Data Series** - Renaming of data series is now done in format data series interface. Additionally, a 'Default' button is now available to change the name back to the original default name.

33. **Quote.com Server Selector –** Quote.com has a large number of servers, but we have found it useful to supply a small program which determines which server is responding the fastest. This program has been improved for release 5.0.

34. **Pop-up Menu Edit Commands** - Cut, copy, paste and delete menu items are now listed in the pop-up menu that appears when the mouse is positioned over a data series and the right mouse button is clicked.

35. **Pop-up Menu Recalculate** – A 'Recalculate Chart' menu item is now listed in the pop-up menu that appears when the mouse is positioned over a blank area of the chart and the right mouse button is clicked. Use the Recalculate Chart menu item to reread data files and recalculate all the calculations in a chart.

    When the chart is based on an external data file that is being updated by an external program, manually recalculating the chart will allow new data from the data file to be incorporated into the chart without having to load and unload the chart.

    Manually recalculating is especially useful when developing external DLL calls and the DLL has been updated since the chart was loaded (Note that 'UNLOADCUSTOMDLLS=' needs to be set to 'True' in the Nstparam.ini file in order to copy over a dll being used by a chart)

Also use the 'Recalculate Chart' menu item to refire a trading strategy or prediction that has inputs of the form Lead(XXX,1) where XXX is raw data like the Open, High, Low, Close or Volume. Use of Lead(XXX,1) allows for a trading strategy or prediction to 'peek' into the next bar to make decisions. Without 'Recalculate Chart', leads work well when backtesting, but not when used in real time since the trading strategies and predictions are fired at the end of each bar when no data exists in upcoming bars. Use of the 'Recalculate Chart' menu item solves the problem, essentially telling NeuroShell Trader when to 'peek' into the data of the red bar forming at the end of the chart in order to revaluate any Lead(XXX,1)'s.

Features in the NeuroShell Trader Professional

The follow ing are the primary new features in the NeuroShell Trader Professional:

I. An Overview of the NeuroShell Trader Professional

The Trader and the Professional Trader are actually the same program, but the softw are protection w ill determine w hether or not a user can run the Professional features. Therefore, if you have the regular Trader release 2.0 or higher, you can easily upgrade to the Professional by email or phone.

There are more details below , but as promised, the Professional Trader has features to optimize the inputs to nets. There have been others w ho have used Genetic Algorithms (GAs) to find inputs to feed a net before, but w e are also finding optimum parameters for the indicators you are using, as w ell as the buy/sell thresholds w hen training by profit. Additionally, there are several new objective functions, not just simple profit.

How ever, the most exciting thing about the Professional Trader may not have anything to do w ith neural nets. The most exciting thing may be the trading strategy optimizer, w hich optimizes systems by GA even if they don't have neural nets! For example, you can enter a traditional trading strategy (using crossovers and breakouts, say) and then find optimal parameters for those crossovers and breakouts. Not only that, but you can tell the optimizer to get rid of useless rules if you have provided several. We have actually built some pretty good trading systems that didn't use nets at all.

Of course, you can use nets and re-optimize thresholds. This may be useful if your strategy has rules other than AB thresholds that should be optimized w ith the AB, or you w ant to optimize on different periods.

II. A System for Professionals Only.

Precisely because of its pow er, the NeuroShell Trader Professional is not for everybody; that's w hy w e call it "Professional". DO NOT ORDER THE NEUROSHELL TRADER PROFESSIONAL IF YOU ARE LOOKING FOR A SILVER BULLET! As you can see, there w ill be a lot of fantastic features w ith w hich you can experiment. But in fact the NeuroShell Trader Professional is not a panacea. You shouldn't just throw "everything but the kitchen sink" at it and expect immediate gratification in the form of fantastic out-of-sample predictions. Although that w orks sometimes, it often does not.

As a pow erful optimizer, the NeuroShell Trader Professional can, w ith very little effort, build highly over-fit models much easier than you can do it yourself! They w ill look great in-sample, but fall apart out-of-sample and during later trading. Also, even genetic algorithms can take a great deal of time optimizing w ith too many variables. For these reasons, you must be professional enough to recognize that pow erful optimizers can do this, and professional enough to experiment and take steps to avoid over-fitting.

Among the suggestions w e have relative to the above are:

1. Start w ith pretty good models and use optimization to make modest improvements to them. Search only a little on either side of the indicator parameters that are presently being used.

2. Make sure you stick to a very few inputs to neural nets (usually about 5). When finding an optimum set of inputs, tell the optimizer to use at most 5 inputs.

3. Make sure that you do out of sample testing w hen you optimize trading strategies.

4. Experiment w ith stopping optimization not long after it has begun to avoid over optimizing.

5. When optimizing neural nets, consider optimizing on out of sample evaluation sets instead of the oldest w alk-forw ard training set. (But don't go back too far in time w hen the market w as different.)

6. Consider and experiment w ith optimizing neural nets or trading strategies, but not both in the same trading system.

7. When optimizing neural nets, use very few hidden neurons. This w ill not only help prevent over-fitting, but w ill keep it from taking forever to optimize.

8. Use different objective (fitness) functions w hen optimizing. These can make all the difference in the w orld. We are providing plenty and considering offering more in the future. Unfortunately, there are no rules on w hen to use w hich ones.

The NeuroShell Trader Professional is a pow er tool, and like most pow er tools, it can help you but only if used properly and carefully.

III. How Are Genetic Algorithms Different than other Optimizers?

Most optimization techniques used today are simple "exhaustive search" methods, meaning that every possible combination is tried to see w hat w as the best one. This is a very accurate approach, since you are bound to find the best combination of variables - eventually. How ever, it is a very inefficient approach, because w henever there are more than a few thousand combinations, it takes too long to try them all. That is w hy users of exhaustive search optimizers tend to limit the number of

variables they use, or tend to limit the number of values these variables can take.

The genetic algorithm, by contrast, does not try every possible combination. It attempts instead to intelligently get closer and closer to the best solution. Therefore, far more variables can be utilized, and you can allow all values of a variable. Optimization can still take a good deal of time if you give a GA a fair number of variables, but it will be doing much more work in that amount of time.

More efficient optimizers than exhaustive search optimizers are in use. If they are not genetic algorithms, however, they are most likely only searching one section of the search space at a time. Genetic algorithms are searching dozens or hundreds of parts of the search space simultaneously. This means they are far less susceptible to becoming stuck in "local minima" as the others quite often do. (Local minima are decent solutions that the optimizer can never "get out of" in order to find better solutions.) However, many of these optimization techniques are faster than a GA provided the problem is easily solved, and not subject to deep local minima.

IV. Features of the Professional Trader

The hallmark of the Professional Trader is the integration of genetic algorithms for a number of different optimizations. The GeneHunter engine is now in the NeuroShell Trader. You can optimize the creation of networks or trading strategies. As previously mentioned, optimization of trading strategies does not require that the strategy contain a neural network.

A. Prediction Wizard Optimizations.
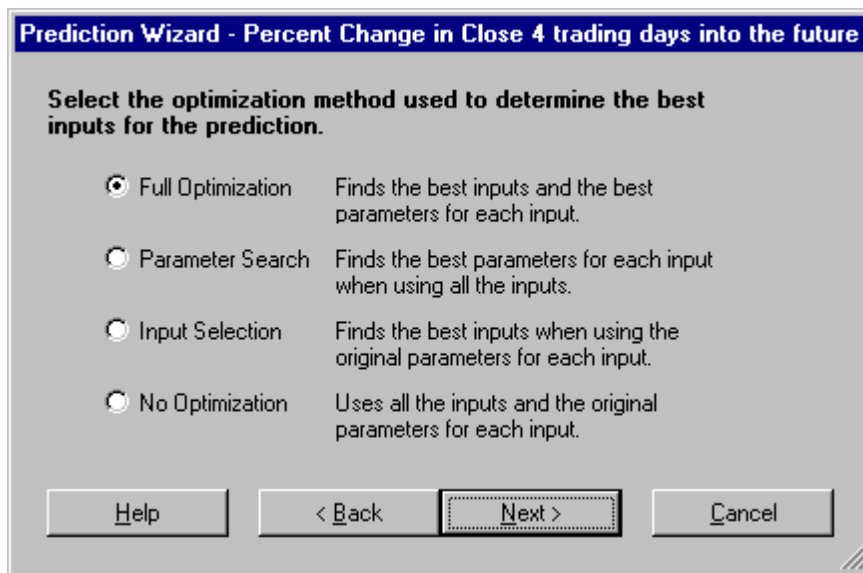
The Prediction Wizard now has a screen (above) that allows one of the following four options (not in this order):

1) Input selection. In this mode the genetic algorithm selects which of many inputs you have chosen are most useful. Only the ones it decides are best are used in the final training. Note that the usefulness of an input is evaluated in conjunction with all other inputs. In other words, the GA is really finding an optimum SET of inputs, not inputs that are by themselves necessarily useful. These inputs do not have to be indicators built by the Trader. They can be any data stream you load. You load quite a few more indicators than you want to eventually use (we wouldn't suggest many more than 20 to 60 for best results). Elsewhere in the wizard you will specify the maximum number of inputs that you want the GA to keep (we like between 3 and 12 to enhance chances of good generalization). The GA will search through combinations looking for the set of inputs which is less than or equal to the maximum number of inputs that you specified and which, as a set during training, optimizes the training criteria (e.g., maximize profit, minimize error, etc.). No parameters of any inputs that are indicators are modified or optimized; they are used just as you have specified them.

2) Parameter Search. In this mode, the genetic algorithm will use all of the inputs you have chosen, but it will optimize the parameters of all indicators you have used as inputs, even if they are embedded in other indicators. In other words, if one of your inputs is the 10 period lag of the 5 period momentum of the close, the genetic algorithm may change the periods to 6 and 3 respectively if the resulting indicator works best. (You can even tell it to select among open, high, low, and close). Note that the optimized parameters are evaluated in combination with the other optimized indicators and other inputs. In other words, it is possible that the parameterization of an indicator does not produce an indicator that is useful by itself. It may only be useful in combination with the entire set of optimized inputs. Note that optimization can only be accomplished on indicators which you have entered using the Trader's Indicator Wizard (even if it was entered from the Prediction Wizard). Other data streams used as inputs will still be used during optimization, but not optimized. Keep your number of inputs between 5 and 30 for best results.

3) Full Optimization. In this mode, both input selection and parameter optimization are accomplished at the same time. This is a very advanced concept, and we are not currently aware of any other programs capable of this using a GA. Note however, that the GA is doing more work (i.e., using more variables) than in doing either input selection or parameter optimization separately.

Therefore, for best results, keep your number of inputs below about 30 if they are all indicators.

4) No Optimization. In this mode, neither input selection nor parameter optimization takes place. The inputs are used just as you have selected them.

There is another form of optimization called threshold optimization that can take place or not in any of the modes above, including the no optimization mode. More on threshold optimization later.

B. Setting Parameter Ranges for Input Indicator Optimization

When the GA needs to do parameter optimization, it needs to know an appropriate range of numbers in which to search. For example, how far back is it reasonable to go for the periods in a lag or a regression slope?

After you enter an indicator into the list of neural network (prediction) inputs, a default range is already set up for you, (e.g., periods might be 1 to 10.) These defaults are pretty reasonable, but you can change them if you wish before the optimization starts. If you narrow the range, (e.g., 1 to 5), the optimization may take less time to find a good solution. However, if the BEST solution was 15, you will not find it. If you expand the range, say 1 to 100, the optimization may take much longer because the search space is larger. Longer lookbacks may not be reasonable to use in many predictions, so the GA is wasting time.

In order to change the range of a parameter, click in the plus sign (+) next to the indicator as listed in the input list (see below). The indicator will be "expanded" to show all of the parameters in it or its embedded indicators. If you double click on any parameter, a dialog box will appear to allow you to set the range.

After you click on plus (+), the parameters are listed below the indicator in the order in which they appear in the indicator. E.g., for the indicator lag(momentum(close,5),5), the 5 for the momentum will be listed before the 5 for the lag.

Prediction Wizard - Percent Change in Close 4 trading days into the future

Make a list of all the instruments and indicators which you think are valuable inputs for predicting Percent Change in Close 4 trading days into the future.

+ CCI(High Price,Low Price,Closing Price,Periods,Deviation Multiplier)
+ DMI(High Price,Low Price,Closing Price,ExpAvg Periods)
- MACD(Time Series,ExpAvg1 Periods,ExpAvg2 Periods)
    Time Series Search Space = Close
    ExpAvg1 Periods Search Space = 1,40
    ExpAvg2 Periods Search Space = 1,40

Add Input(s) ...   Modify Input   Remove Input(s)

Help   < Back   Next >   Cancel

C. Controlling Optimizations - The General Tab

Most of the General tab is familiar to previous users of the NeuroShell Trader. The new combo box labeled "Number of optimal walk-forwards" is visible only in the Professional Trader. This box allows you to decide which set of data is "in sample" for evolution, the evolutionary "training" set if you will. You can choose either "Optimize on training set", as was done in the picture above, or you can choose "1 optimal walk-forward test", "2 optimal walk-forward tests", etc. Your choice determines how the GA proceeds with evolution as follows:

1. Optimize on Training Set - In this mode, the GA tries to get the best results it can on the oldest training set in all the walk-forwards you have chosen to use during training. For example, if you have selected to use 3 walk-forward tests, the GA will find the inputs that work best on the training set of walk-forward #3. After optimization is finished, the inputs chosen will also be utilized for the normal training of the other walk-forward training sets and the current net. You may consider that you are over fitting only on walk-forward #3 training set. The GA is not really over fitting on walk-forward #3 evaluation set, or the other walk-forwards.

If there are no walk-forwards, the GA optimizes on the current net.

2. N walk-forward tests - In this mode, N new walk-forwards are added, all older than the oldest you have already specified for training. In other words, suppose you have specified 3 normal walk-forward tests, and then for optimization you specify "2 optimal walk-forward tests". The system will add walk-forwards 4 and 5, The GA will base its input selection on how well the evaluation periods for BOTH walk-forwards 4 and 5 perform.

This mode provides an extra layer of generalization to keep the GA from over-fitting, because the optimization is done on the neural networks' evaluation sets.

D. Controlling the Optimizations - The Objectives Tab

The objective tab gives the user a choice of training objective functions (genetic algorithm fitness functions). The combo box has a broad assortment of built-in functions from w hich you can choose, including the familiar error minimization of the pervious release. There are now quite a number of profit oriented functions, including:

return on account, net profit, ratio gross profit/loss, % profitable trades, average trade profit, max draw dow n, max open trade draw dow n, ratio net profit/max draw dow n, average bar profit.

There are also some new error oriented functions, including:

correlation, mean squared error, and R squared.

Not all functions may result in the type of trading you like to accomplish, and how they perform could depend upon many factors, like the issue you are trading, the inputs you have chosen, the time periods chosen, and many other things. If some objective functions don't perform for you, try some others.

Note that even if you select minimize error, trading statistics for the net can still be calculated based on the trading rules on the bottom of the dialog box. You can still choose w hether you w ant trading simulated w ith long positions, short positions, or both.

At the bottom of the dialog box, you may specify your ow n trading rule thresholds, or you may let the genetic algorithm find them.

Note that the "profit" objective in the old Trader is the one that is now called "Return on Trades".

E. Controlling Optim izations – the Advanced Tab
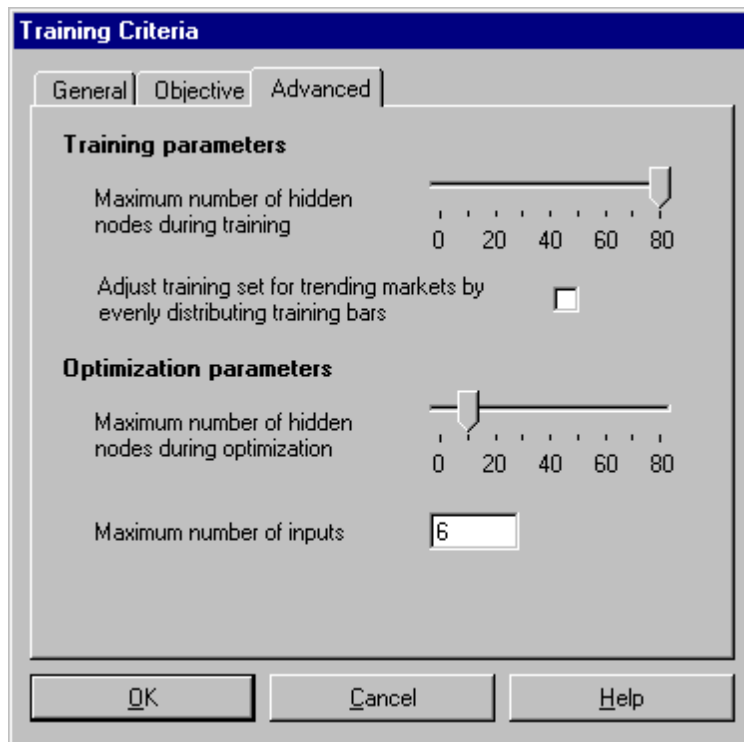
The advanced tab can play a very important role in how optimization is accomplished. Since this is a professional program, you have some flexibility in determining how the program works. You also have a responsibility to experiment and find out what is right for you; we cannot do more than provide general guidelines.

Realize that during optimization, the genetic algorithm is choosing inputs, parameters, and thresholds (depending upon your selections) and then training and applying a network with each such choice. Hundreds or even thousands of networks might be trained.

Understand too that the Turboprop 2 network paradigm trains by adding hidden neurons one by one, up to a maximum of 80. Zero hidden neurons produce a linear model, and the model becomes more and more non-linear the more hidden neurons are added. Generally speaking, the more hidden neurons added, the "tighter" the fit becomes and the longer the training takes. (Previous practitioners of older types of neural nets like the primitive "backpropagation" nets are cautioned not to try to equate Turboprop 2 performance with a certain number of hidden neurons with backpropagation performance using the same number. These are very different algorithms.)

Therefore, it should be obvious that the more hidden neurons that are added during training of the many nets of the optimization phase, the longer optimization will take. We have therefore provided a sliding bar to allow you to set the maximum number that can be added during the genetic optimization. The default is 15. It is under the heading Optimization Parameters.

After optimization, the net is trained one final time using another number of hidden neurons that you can set under Training Parameters. If this number is set different than the number used during optimization, the final results will be different than the optimal results found during optimization (perhaps better, perhaps worse). The default is 80, meaning you will get a well trained net after optimization. The default is 80 for compatibility with the old trader; you may do better setting this factor lower, probably the same as the number of optimization neurons.

Next, if you have selected the Input Selection or Full Optimization mode of optimization, you may select the MAXIMUM number of inputs that the GA is allowed to use. The GA may determine that less is better. Remember that the more inputs in a network, the greater the chances of "over-fitting".

Finally, we will discuss the small check box marked "Adjust training for trending markets by evenly distributing training bars." Understand that neural networks are pattern recognition devices: they make predictions based upon what happened during training when they encountered similar patterns. If your training set covered a period of a strong and sustained bull or bear market, the majority of the patterns are likely to be all in one direction. Neural nets aren't likely to predict the other direction well at all in such a case. Ideally, you'd like to have about half of your training patterns showing uptrends, and the other half showing downtrends, to varying degrees.

Turning on this option will cause your training sets to be automatically balanced in this way. If you are predicting some output that shows both positive and negative numbers (like percent change), the algorithm will produce a training set having roughly the same number of both signs. If your output is an indicator that always has the same sign (like an indicator that is always between 0 and 100) then the algorithm will select even numbers above and below the mean based on the data's distribution.

F. Optimization of Trading Strategies Using Genetic Algorithms.

As previously mentioned, this may be the most exciting feature of the Professional Trader, because it enables optimum trading strategies to be built even if they do not involve neural nets. It will also optimize all of a strategy if some conditions use nets and some do not. It means the Professional Trader is no longer just a neural network package, but a complete artificial intelligence driven trading system.
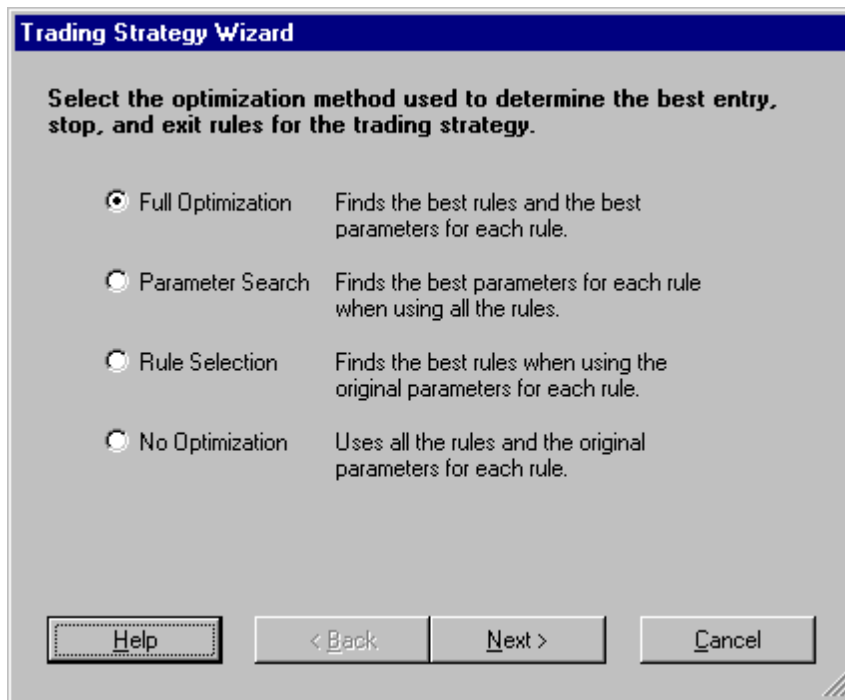
The Trading Strategy Wizard now has a dialog box like the one shown above. There are several choices for optimizing trading strategies. Instead of selecting inputs, or selecting parameters of indicators used as inputs like the Prediction Wizard does, the Trading Strategy Wizard does something different but similar.

Recall that trading strategies are essentially rules (conditions) that initiate buying or selling whenever some number that you specify are true. The conditions are indicators that may have parameters associated with them, e.g., AB where A is the net prediction and B is lag(momentum(close,3),2). The GA will select amongst multiple conditions, and also select the parameters in those conditions, as follows:

1. Parameter Search - all of your conditions (rules) are used, but the GA evolves optimum parameters for you. These parameters do not produce rules that are individually optimum, but optimal as a complete set.

2. Rule Selection - Chooses among all the rules you have specified, leaving you with only the ones that work best together.

3. Full Optimization - performs both Parameter Search and Rule Selection at the same time.

4. No Optimization - Performs just like the Trader's Trading Strategy, not modifying deleting any rules and not modifying any rule parameters.

G. Controlling Trading Optimization - the General Tab

In this tab, the label "Range of dates Used to Evaluate Trading Strategy" is new . If you choose "User specified date ranges", then the Dates tab becomes active for more specific selections (see below).

If you choose, "Match date ranges to prediction(s) used in trading strategy", then the wizard will match in-sample and out-of-sample sets to those used by the Prediction Wizard. This feature is only available if you have nets somewhere in your trading strategy, and those nets had walk-forwards. The evolution optimization is performed on the in-sample data the nets used (marked on the out-of-sample net as a gray line), and the backtest itself is done on the networks' out-of-sample data (shown on the chart as a green prediction line). Using this option gives you the most protection against over-fitting, because the final backtest is done on a time period that was neither in-sample for the neural nets nor for the genetic algorithms.

H. Controlling Trading Optimizations - the Dates Tab

This tab allows you to set your own dates for both optimization (shown on the bottom of the dialog box) and for the subsequent backtest. Only the bottom of this dialog box is new in the Professional Trader.

In the picture above, we have elected to optimize over the same period as the subsequent backtest. This is a little risky, because we are really looking at in-sample results. On the other hand, the NeuroShell Professional Trader is, we believe, the first software to optimize trading strategies that actually offers an alternative. In other words, we are the first to provide a backtest out of sample from the optimization. Therefore, you might want to take some risk here since it has been standard practice for some time.

If you do not want to take that risk, you can elect to optimize over a time period prior to the backtest (like two years as shown above), or back to a specific date.

If you select the option back to a specific date, the optimization will end when the backtest begins, unless the specific date you choose is actually within the backtest period. In that case, the optimization period will end when the backtest ends.

I. Optimization Progress Bar.

During an optimization of a prediction or a trading strategy, there is a progress bar that shows approximately the progress of the optimization and the amount of time remaining. Please don't set your watch by this bar! Due to the method of genetic optimization we are using, it is impossible to know exactly when the optimization will end. Frequently, the bar will even be moved backwards when a better solution is found and the algorithm decides to continue longer. So the time estimate is very rough indeed.

J. Saving of Custom indicators.

Indicators you build can now be saved and used later in different charts. Saved indicators can also be loaded into the regular Trader, meaning that you can now sell or distribute indicators to all NeuroShell Trader users. You can save them in existing indicator categories, or invent your own.

To create a custom indicator, first build it in the Indicator Wizard as usual. In order to save your indicator, you use the Save Indicator button in the Indicator Wizard. To activate this button, click on any level of the indicator as shown in the picture below :
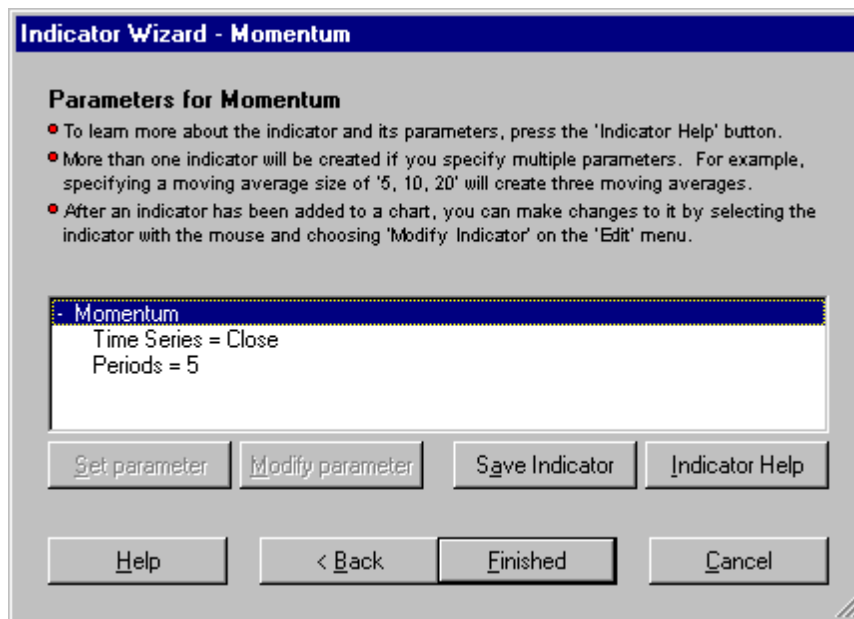
Then the following dialog box appears:

Furthermore, if you distribute one of these custom indicators, you can specify the help topic and help file that will be displayed if the end user presses "Indicator Help". Of course, you are responsible for writing this help file yourself.

The Advanced button brings up the following:

The parameters of those indicators can be hidden from end users, meaning that your proprietary secrets will be safe. Also, parameters the user sees can be mapped to multiple parameters in the indicators. For example, if your custom indicator uses close a lot, the user only had to define it once.

K. Alerts

The Professional Trader can allow creation of sound and/or popup custom text alerts when an event occurs. Unlike some packages that have a limited number of alerts available, the NeuroShell Trader alerts are unlimited in scope and can be based upon any combination of indicators, predictions, and/or trading strategies.

Alerts are inserted from the Insert menu, just like indicators:
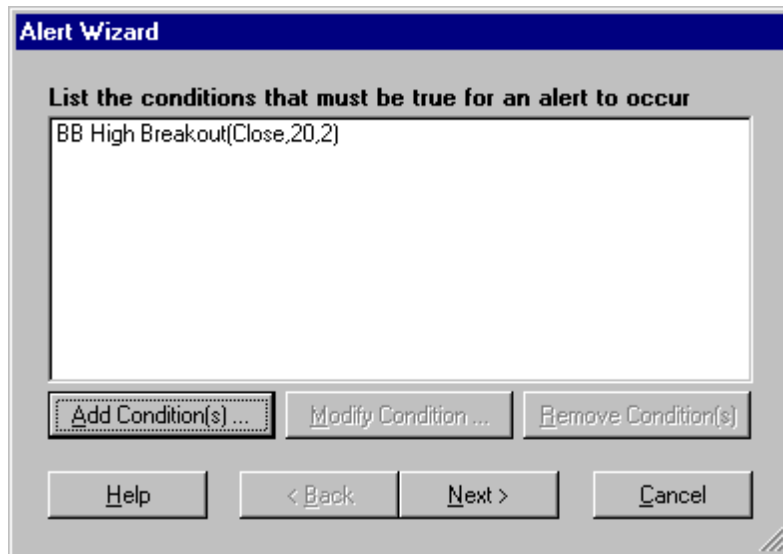
You can give your alerts special names and even notes to yourself:
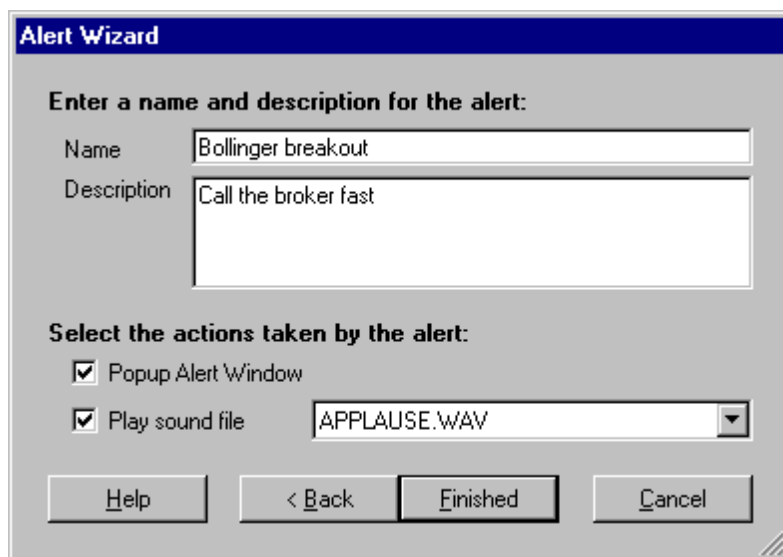
Then, w hen you later view the Alert w indow , you are notified of all alerts (like all such layouts in the Trader, clicking on a column sorts the display by that column):

Alerts can be modified in the same manner in w hich you modify indicators, predictions, and trading strategies.

L. Calls to NeuroShell 2 and Predictor/Classifier Nets

You can now call neural netw orks you created w ith NeuroShell 2, NeuroShell Predictor, or NeuroShell Classifier w ithin the

Trader. These net calls are special indicators in the 'External Program & Library Calls' category in the Indicator Wizard. You still have to train these nets within the respective programs, but they can be fired in the Trader, looking like an indicator. This indicator can then be used in a trading strategy, another indicator, or even another net. It is easy to train nets in these programs using Trader data if you use the Trader's file export facility.

In order to call Predictor/Classifier networks, you must own the NeuroShell Run-Time Server.

When you call the indicator to fire NeuroShell 2 nets you must not only pass it the inputs to the net in the proper order, but the path to the .DEF file as well. For Predictor and Classifier nets, you will need the path to the saved network file as well as the inputs.

M. Calls to user created DLL functions/subroutines

The NeuroShell Trader Professional now has indictors that can call external DLLs created (usually) in C or C++ ('External Program & Library Calls' category in the Indicator Wizard). This is a very powerful feature, because it means that now you can build custom indicators and other functions and use them in the NeuroShell Trader. You can even build a business selling these to NeuroShell Trader users. However, you will need to have a programmer available to help you set up the calls to the DLLs, and the programmer will have to know something about the DLL he/she is trying to call.

There are two types of DLL calls:

1. Calling DLL by value. In this mode, the DLL is called once for each bar. The inputs to the DLL will usually be some current or lagged values, and the output will be associated with that bar on the chart. This mode would be perfect for building a custom

indicator in C++.

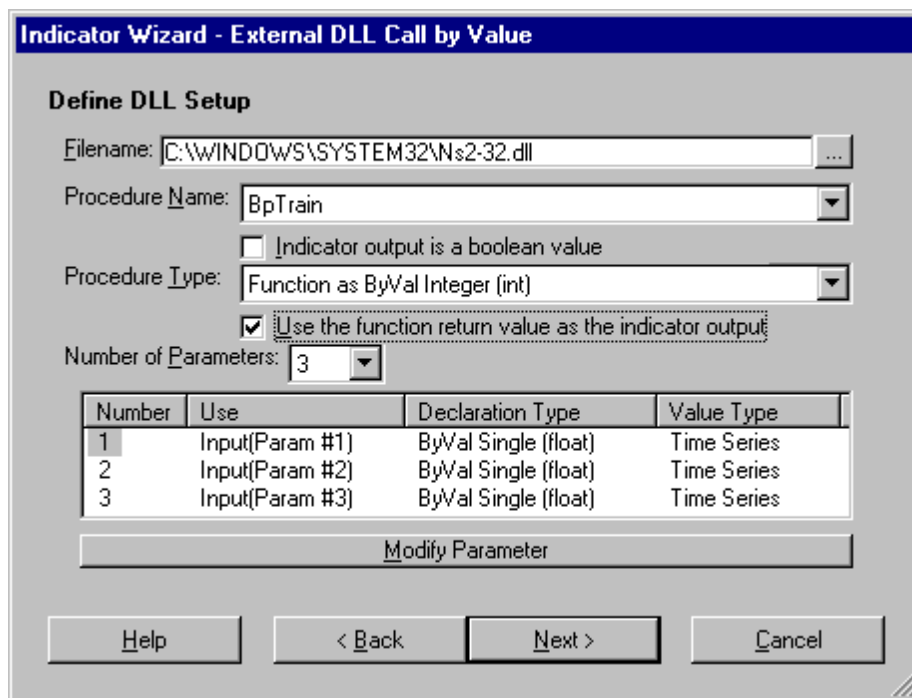2. Calling DLL by array. In this mode, the DLL is called only once for the entire chart. Each parameter is an array that is as large as the number of bars loaded in the chart. The output is an array of the same size. This mode is for building some sort of process that needs all the data at once. One example might be your own custom model, like a neural network. Note, however, that training a neural network could take some time, during which the user is staring at a frozen chart. Also, the indicator is called each time the chart is refreshed, so you will want to have a mechanism that is aware that it shouldn't retrain each time the DLL is called.

N. New Indicators

We have added 10 Fast Fourier Transform indicators, 21 Principle Component Analysis indicators, and 12 Wavelet indicators (a new indicator category exists for each type).

Features in the NeuroShell DayTrader Professional

Overview

This is the premier product for day traders and aspiring day traders. Now you can join the revolution and build systems that give buy and sell signals on 1, 2, 5, 10, 15, 20, 30, and 60 minute bars, as opposed to the daily bars that are in the Trader and Trader Pro. You can w atch each tick change the high, low , and close of the last bar on the chart, until the bar is finished and becomes part of your trading system. Use your alerts to w ake you up from your nap, if you are one of the few w ho w ill be able to sleep w hile the DayTrader is running!

You are going to need a special real time data feed to use the DayTrader. There are many such feeds available, and w e may eventually support more of them, but this first version of the DayTrader only supports one. We could have held up the DayTrader until more data feeds w ere supported, making more of you happy, but that w ould take a great deal more time. We elected to release the product w ith only one feed supported, even though it may not be YOUR feed. If you are w illing to use the one w e now support, the DayTrader is for you. If you w ant to join the revolution later w hen w e can support something you like better, you can do that too.

Data Feed

For this, the first version, w e are using Lycos-Quote.com (from them you'll need Qfeed or Qcharts. For info, see w w w .quote.com). We chose Quote.com because they have historical tick data that w e can load from the Internet, and you need historical data to build nets and backtest trading strategies.

In the future, w e may add more data services that can supply historical data online. We may add also some services that do NOT supply the historical data, w hich w ill necessitate that w e supply some sort of historical data server of our ow n.

Currently, w e have not built such a server, and in fact, even charts made w ith Quote.com w ill require data reloading each time you bring up the chart. This w ill not be an issue unless you w ill be one of those w ho use excessive amounts of data on slow modems. For you, w e recommend DSL or cable model Internet feeds. Also, read "Simple Models and Less Data" below .

The bottom line is w e are looking, but w e are making no promises at this time about any other data feeds or interfaces.

Popular Issues are Now More Amenable to Modeling Technology

One interesting thing about the DayTrader is that it opens a w hole new w orld in terms of w hat stocks or other issues are predictable. For the first time, you can use neural nets on rapidly rising stocks like Yahoo, AOL, and Dell, because they fluctuate greatly during the day, even though they mostly go up on a daily basis (at least they did prior to the new year!).

Avoiding Overnight Price Jumps

Another interesting thing is that now you can avoid the gaps betw een today's close and tomorrow 's open, gaps that often aren't explained by technical indicators. Get in and out of an issue as many times as you w ish during the day, and close the position at the end of the day.

This "gap avoidance" is done in tw o w ays. First, w hen you insert an indicator, you can check a box that instructs that the indicator NOT be computed across day boundaries. Neural nets w ill not train on bars w here the input indicators are missing.

Second, you can add trading strategy conditions based on time of day. For example, you can enter a trade if both of the follow ing conditions are true:

  Your Indicator > 50
  Time < 3:30 PM

Then you might w ant to exit if either of the follow ing is true:

  Your Indicator < -50
  Time > 3:45 PM

Simple Models and Less Data

In our experience, the more complicated models that are needed for end of day position trading are not necessary for intraday trading. Simple models often w ork w ell.

Furthermore, since you are dealing w ith shorter bars, you w on't have to go back years in time to build neural nets and backtest

strategies. That way you aren't using training sets on market conditions that are now ancient history. If you download 2 days of 1 minute bars, you have the rough equivalent of 3 years of daily bars. Training sets of just the last few days are not only feasible but also advisable in our opinion.

On the other hand, some will disagree with us (after all, that's what the Trader is all about: building models the way YOU want them instead of how someone else tells you models should be built!). Some will feel that longer periods may be better for training to pick up trends. If you use 90 trading days of 30 minute bars, you will have about 1170 bars, roughly equivalent to around 4.5 years of daily bars! So still, you do not have to go back to the Stone Age for data.

Optimal Performance

The bottom line will be this: for optimal performance, limit charts to only a few stocks with a couple weeks of intraday data if you are using small bars. Excessive time frames of small bars will likely result in lengthy data loading and slower program performance.

Interface

The interface for the DayTrader has pretty much the same interface as the NeuroShell Trader Professional. The first difference you may notice is that instead of just daily, weekly, and monthly bars, you can chose smaller intraday bars down to 1 minute bars. (Note: even though we only go as low as 1 minute bars, you can still see the ticks as they change the current bar being built.)

The next difference you will see is that the charts are no longer just daily. Since the bars occur all day, the charts can be zoomed in to intervals less than one day.

The third difference is that other intervals such as training periods, evaluation periods, backtest periods, etc., can also be chosen in smaller time intervals.

The fourth, and perhaps final MAJOR interface difference, is that we have combined the Data Download menu and the Data Directories menu into a new menu called "Data Sources". It is here that you will also find a "Server" tab that enables you to specify the real time server (with only Quote.com currently as a selection). Also, you can select those exchanges from which you may want to download. This interface is going to be the same interface for the regular Trader and Trader Professional in release 3.0 - minus the Servers tab.

Daily Data Too!

It is worth noting that Quote.com can also supply daily data as well as intraday data. Just check the little box marked "Use server as an end of day source". Then, when you load a daily, weekly, or monthly chart, the Quote.com server will download the data. Downloading usually takes only a few seconds for about 10 or 12 years of data.