August 2013

Dear NeuroShell, GeneHunter, AI Trilogy, or ChaosHunter User:

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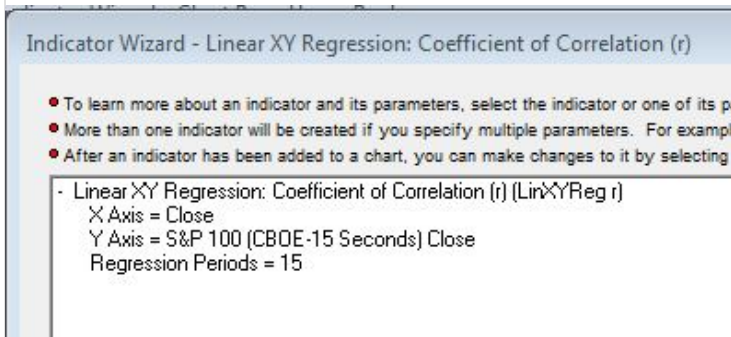
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In this issue:

I. Portfolio balancing in NeuroShell Trader with chart page indicators and position sizing
By Marge Sherald, CEO

In a previous newsletter we showed you how to use chart page indicators to balance a portfolio based on the ranking of a single indicator such as Relative Strength Index (RSI).   In this example we're going to expand the concept to a portfolio of 16 stocks selected from the S&P 100 index on a daily chart. The comparison is based on the correlation of the stock's current close compared to the close of the S&P 100 index. The evaluation is done using the Linear XY Regression Coefficient of Correlation indicator from the Trader's regression category of indicators.

```
Indicator Wizard - Linear XY Regression: Coefficient of Correlation (r)

 ● To learn more about an indicator and its parameters, select the indicator or one of its pa
 ● More than one indicator will be created if you specify multiple parameters.  For exampl
 ● After an indicator has been added to a chart, you can make changes to it by selecting

- Linear XY Regression: Coefficient of Correlation (r) (LinXYReg r)
     X Axis = Close
     Y Axis = S&P 100 (CBOE-15 Seconds) Close
     Regression Periods = 15
```
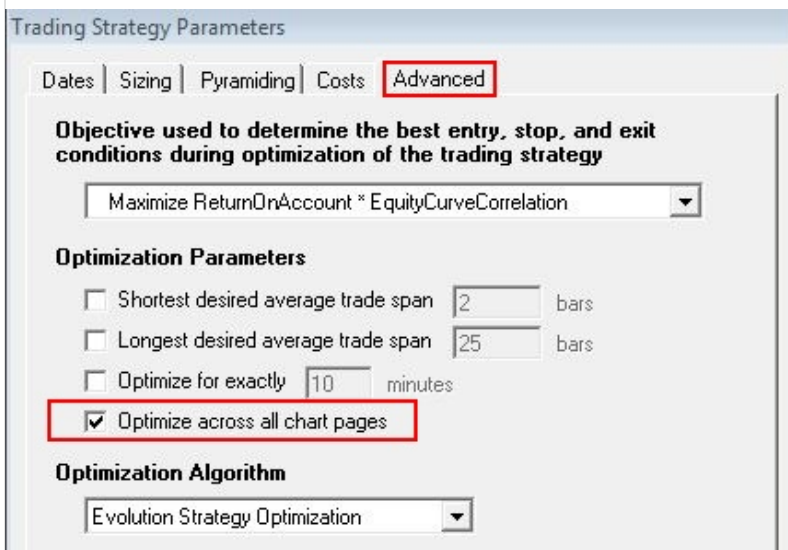
* The data stream for the S&P 100 index is the one that is calculated every 15 seconds by the Standard and Poor's Corporation, but daily bars for the index were used in the chart.
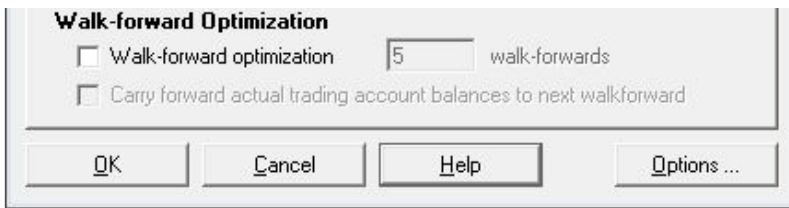
The rules are Enter Long for the top 4 stocks that are least correlated with the index. Using the Chart Page Upper Rank indicator, buy the stocks that are ranked #13, 14, 15, and 16 out of 16 stocks. For the Long Exit, get out when any of the stocks currently in a long position are no longer ranked in the 13 to 16 range for the regression comparison.

On the short side buy the stocks that score 1 to 4 in the Upper Rank Indicator calculation. Cover the short for those stocks when they no longer score in the 1 to 4 range.
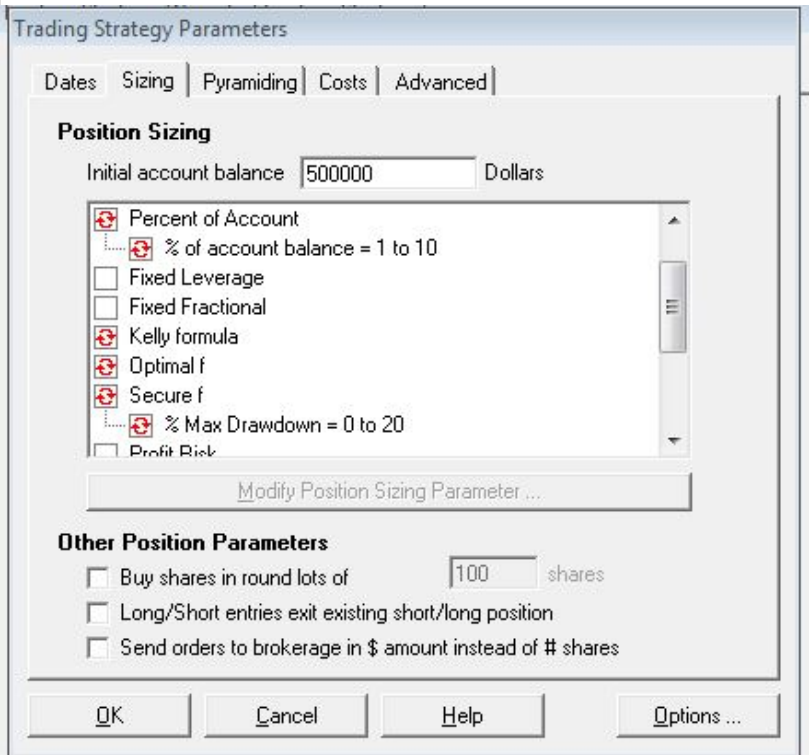
We linked the number of periods in the regression calculation so they are the same for all of the rules in the Trading Strategy.

Because we are using the Chart Page upper Rank indicator, we set the Trading Strategy to optimize across all chart pages. Choosing this setting forces the optimization to choose the same rules and parameters for each chart page, based on an average result across all chart pages.

```
Trading Strategy Parameters

 Dates │ Sizing │ Pyramiding │ Costs │ Advanced │

   Objective used to determine the best entry, stop, and exit
   conditions during optimization of the trading strategy

       Maximize ReturnOnAccount * EquityCurveCorrelation        ▼

   Optimization Parameters
       ☐ Shortest desired average trade span   2      bars
       ☐ Longest desired average trade span    25     bars
       ☐ Optimize for exactly   10     minutes
       ☑ Optimize across all chart pages

   Optimization Algorithm

       Evolution Strategy Optimization      ▼
```

We used a NeuroShell Trader Power User feature to decide how many shares of each stock to buy. On the Sizing tab in the Trading Strategy wizard, we chose several different position sizing methods and let the optimizer decide which one to use.

Trading Strategy Parameters

Dates   Sizing   Pyramiding   Costs   Advanced

Position Sizing

Initial account balance   `500000`   Dollars

- 🔄 Percent of Account
  - 🔄 % of account balance = 1 to 10
- ☐ Fixed Leverage
- ☐ Fixed Fractional
- 🔄 Kelly formula
- 🔄 Optimal f
- 🔄 Secure f
  - 🔄 % Max Drawdown = 0 to 20
- ☐ Profit Risk

Modify Position Sizing Parameter ...

Other Position Parameters

☐ Buy shares in round lots of   `100`   shares

☐ Long/Short entries exit existing short/long position

☐ Send orders to brokerage in $ amount instead of # shares

| OK | Cancel | Help | Options ... |

The Trading Strategy produced a system that remained profitable in the out-of-sample period, in spite of a market that was dropping during the last week of the out-of-sample period.
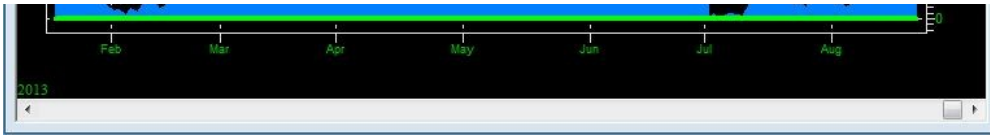
A NeuroShell Trader chart that illustrates the Trading Strategy described in this article may be downloaded from www.ward.net in the "New and Updated Examples" section.

II. A note about interpreting ChaosHunter formulas using Relational or Boolean operations

By Dr. Andrei Deviatov, lead developer of ChaosHunter

ChaosHunter has a rich variety of operations to choose from when optimizing a formula. Among those are relational and Boolean operations such as "x>y", "x and y", etc. Normally, in all programming languages the result of a relational or Boolean operation is True or False. If such an operation enters in a ChaosHunter formula that also contains pure numerical operations (e.g., "x+y"), it is not very clear how to interpret or compute such a formula. Moreover, certain programming languages (NinjaScript, for instance) cannot simply convert a Boolean True/False to a number "on the fly".

Here is an example of a hypothetical formula:

```
Predicted = sigmoid( Mom(Close,5) > 1 )
```

If you simply stick in this formula into an indicator in NinjaScript, it won't compile and will generate an error because it cannot convert the Boolean `Mom(Close,5)>1` to a number. The same problem may occur in other trading/programming platforms.

The solution is to first interpret a relational or Boolean operation, convert its result to a number and store it in an intermediate numeric variable. Internally, ChaosHunter uses a simple approach when dealing with Boolean values: False=0, True=1. Whenever a relation or a Boolean operation is True, its result is set to 1. If a relation or a Boolean operation is False, its result is set to 0.

In order to convert the above formula so it may be compiled in NinjaScript, we use an intermediate variable `v1` of type double:

```
double v1;

v1 = Mom(Close,5)>1 ? 1 : 0;

Predicted = sigmoid(v1);
```

Using a metalanguage, this is equivalent to:

```
double v1;

if Mom(Close,5)>1 then v1=1 else v1=0;

Predicted = sigmoid(v1);
```
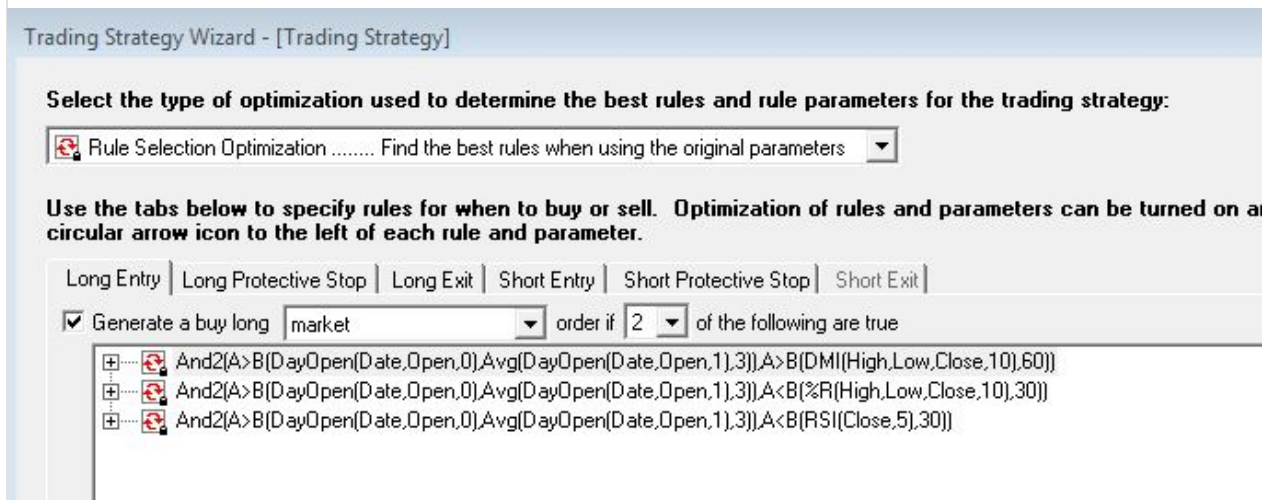
III. What happened to my rule

By Marge Sherald, CEO

1. Locking rules and how you might still lose them

If you lock a rule in a Trading Strategy (signified by the black lock on a rule), you might assume that it must be used in the final optimized Trading Strategy. However, that is not necessarily the case. Locking a rule means that it must be considered in the final solution (and perhaps the parameters in the rule will be optimized). However, if there are enough other conditions that may become true to meet the requirement that 2 of the 3 must be true, for example, your locked rule may not be used.

There are some ways to make sure that your rule is included no matter what the optimizer does. The first is to include your "mandatory" rule as part of a Boolean "and" indicator. For example, if you want your Trading Strategy to buy if the day open on an intraday chart is greater than a 3 day average of the day open (the mandatory rule) and if 2 of 3 other conditions are true, use the 3 Boolean "and" rules listed below (be sure to link the parameters on the mandatory rule so they remain the same over all 3 rules):

Trading Strategy Wizard - [Trading Strategy]

Select the type of optimization used to determine the best rules and rule parameters for the trading strategy:

Rule Selection Optimization .... Find the best rules when using the original parameters

Use the tabs below to specify rules for when to buy or sell. Optimization of rules and parameters can be turned on a circular arrow icon to the left of each rule and parameter.

Long Entry | Long Protective Stop | Long Exit | Short Entry | Short Protective Stop | Short Exit

☑ Generate a buy long market order if 2 of the following are true

And2(A>B(DayOpen(Date,Open,0),Avg(DayOpen(Date,Open,1),3)),A>B(DMI(High,Low,Close,10),60))
And2(A>B(DayOpen(Date,Open,0),Avg(DayOpen(Date,Open,1),3)),A<B(%R(High,Low,Close,10),30))
And2(A>B(DayOpen(Date,Open,0),Avg(DayOpen(Date,Open,1),3)),A<B(RSI(Close,5),30))

Note that the Long Entry says to buy if 2 of the following (3 conditions) are true.

In the example chart that we'll post on www.ward.net in the Trader Examples section, the optimizer only kept 1 of the AND rules listed above, but the mandatory condition remained in the optimized Trading Strategy. Look at the Boolean AND Rules Trading Strategy in the example chart for details.

Another method is to create a Trading Strategy with the three optional rules and let the optimizer do rule selection (Pick 2 Out of 3 Rules Trading Strategy in the example). The final step is to create another Trading Strategy (Combined Trading Strategy in the example) that is not optimized. This Trading Strategy uses the mandatory rule and the trading signal from the Pick 2 Out of 3 Rules Trading Strategy.   Both must produce a trading signal to enter a trade in the Combined Trading Strategy.

IV. New Order Management System for NeuroShell Trader by Clarkson Jones, Monarch Capital Management

As a professional fund manager now for many years I've used my fair share of software in the discovery / production process.

I was lucky enough to have known Steve Ward and I have found both ChaosHunter and NST very valuable tools for the modeling of time-series data. Steve worked with my team of scientists and developers on several cutting

for the modeling of time series data. Steve worked with my team of scientists and developers on several cutting edge ideas. We have some of them deployed in high frequency venues in the currency and futures markets. Cheers to you Steve !

I run a disciplined firm of quants/developers who insist on simplicity in order delivery. We trade in several venues. Sometimes we are sending orders into retail deal-flow; other times we are dealing directly with banks or the ECNs. Initially we were transferring models developed in ChaosHunter and NST into other front-end delivery code but we found this translation process cumbersome and risk-prone. To simplify our production process we developed the trade pump feature in NST to translate our orders into the production environment. For .md files we have developed in ChaosHunter the process is smooth sailing from discovery to production using NST as a direct to exchange software !

We have completed an OMS (order management system) in Java for Knight/Getco (Hotspot FX) and we are working to develop another version to send orders into any MT4 server/client. The Order Management System runs alongside NST as a standalone client which reads NSTs orders and sends them as a Java message to the Hotspot servers. The ECN then takes these orders into FIX protocol and sends them out to various liquidity providers in the network to work the orders. We have very little latency (sub 5ms) and have a clean log to work through at the end of the trading session. We have a built-in feature to allow us to reconcile the NST log with the Hotspot log for any possible discrepancies. All of the order types possible in NST are workable in the OMS. We have several other market-making features for high-frequency venues.

For inquiries or interest in our developments, please write to me: Clarkson@monarchcapmanagement.com

Happy Trading !

Clarkson Jones

Monarch Capital Management

V. ChaosHunter upgrade and Trader add-on sale

Granny wants everyone to be prepared for back to school so she said to put ChaosHunter upgrades on sale so everyone is working with the latest version, ChaosHunter 4, which adds the Formula Editor to a pretty amazing tool. Granny also said to include the following Ward Systems Group add-ons:

Adaptive Net Indicators
Adaptive TurboProp2
Advanced Indicator Set 1
Advanced Indicator Set 2
Advanced Indicator Set 3
Cluster Indicators
Fuzzy Pattern Recognizer
Fuzzy Sets
Neural Indicators
Pattern Matcher
Turning Points

If you want to check out the discounted prices or place an order, go to www.ward.net/60.asp. If you use the

regular order forms on www.NeuroShell.com or www.ChaosHunter.com, you might end up paying full price. You may also call us at 301 662 7950.

The sale ends Saturday, August 31, 2013, so order now.

VI. Office Closing for Labor Day, September 2, 2013

Our staff will not be here on Monday, September 2, 2013, so they may celebrate the Labor Day Holiday. The office will reopen on Tuesday, September 3.

Since Labor Day usually signifies the end of summer, we will return to our regular work schedule: Monday through Thursday from 9 am to 5 pm eastern time and Fridays from 9 am to 4 pm eastern time.

VII. One way to stop this newsletter

It is really easy. Just change your E-mail address and don't tell us.

Web Pages:

  www.wardsystems.com   (Science and business software sales page)

  www.neuroshell.com   (NeuroShell Trader sales page)

  www.chaoshunter.com   (ChaosHunter sales page)

  www.ward.net   (Advanced site for users with Discussion Forum)

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