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Variety is the Best Brainfood for Neural Networks

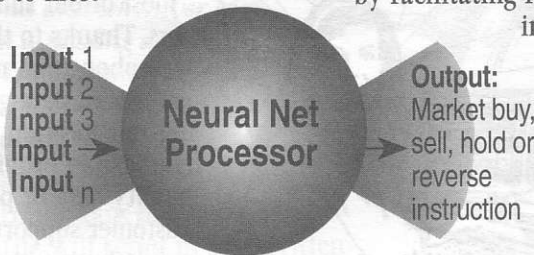
Neural network (nyōōr'əl nēt'wūrk) *An artificial system of neurons or information receptors that combine in an attempt to simulate features and characteristics concerning the physiology of the human brain. RCP*

The definition of "neural network" is probably not news to most traders. Neural networks have been around for a while and they have helped many investors reap greater profits. Though technically accurate, the above definition gives no clue as to how neural

networks are created or what input is used for the analysis. Unfortunately, many investors and even some software developers don't seem to understand some basic concepts of neural network design

We have discussed in past journals some of the mechanics of neural networks by exploring the "how" process of development. However, it seems that we can't stress enough that the content, form, structure and substance of the input for a neural network are at least as important as the algorithm used for analysis. This is a vital consideration for both the network designer and neural net trader, who ultimately decides which time series are to be made available to the system. When the data is processed improperly, the neural network can be as non-productive as any flawed system - and as financially disastrous.

Neural networks are sophisticated processors of meaningful input stimuli. The input may or may not be totally independent and uncorrelated. In fact, the addition of a totally random time series of white noise may help to enhance and balance a neural network by facilitating fuzzy control. For



Positive and inhibitory inputs feed neural network processor to provide explicit buy, sell, hold or reverse instructions for tomorrows markets

investors, the network's purpose is to formulate a level of predictive power when applied to a dependant variable. The dependant variable represents a time

series of prices for the specific market we wish to predict.

The input stimuli is hypothesized to affect the future direction of the dependant variable. It is typically reduced through mathematical transformations into a form that is suitable for the processing network. Input suitability and the transformations applied to the inputs are key to a workable result.

A meaningful and potentially useful neural network should introduce several markets as independent stimuli for the purpose of determining and measuring the reliability of a forecast. For example, some of the independent inputs for predicting T.Bond prices might include time series for the Eurodollar, the Japanese Yen, the U.S. dollar index, the S & P 500 index, the Federal Funds Rate and

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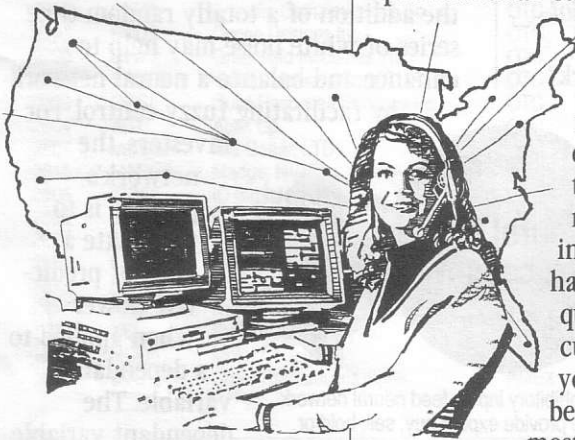
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CSI accepts advertisements to accompany our Technical Journal for the sole purpose of defraying postage costs.

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Service Across the Miles

I've heard it said that the three most important factors affecting a business are (in descending order): location, location and location. Probably written by a real estate broker, this old adage doesn't really apply to CSI. In the data business, we believe the key factors are (in descending order): service, service and, of course, service. To our way of thinking, good service means accurate data, delivered on time, with the help of a courteous, professional staff. Nestled on the east



coast of Florida, we are a long way from the exchanges and most of our subscribers. Thanks to the telephone and modern means of data gathering, our location isn't a handicap in providing quality data or personal customer support. Won't you help us serve you better by making the most of each call to CSI?

Whenever calling CSI, be sure to:

- 1 Know your User I.D.
- 2 For billing questions, know your invoice number.
- 3 If you're calling about a problem, have all the specifics ready to relate to the service representative.
- 4 For technical assistance, try to be at your computer with your CSI software running.
- 5 Take notes if you are given instructions that you can't implement while on the phone. This can save you an unnecessary call-back.
- 6 Use the correct phone line: For orders, dial 1-800-274-4727 (Mon-Fri 9-6). To speak with a customer service or bookkeeping representative, dial (407) 392-8663.
- 7 Call during off-peak hours (Tuesday through Friday 1:00-5:00 p.m.) for calls that aren't urgent.
- 8 Please *do* call us when you need assistance. We're here to help! ♦

Customer Service Hours

Monday - Friday
8:30 a.m. to 11:00 p.m.

Saturdays
9 a.m. to 1 p.m.

(all times eastern)

Variety is the Best ...

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perhaps the T. Bill rate. Additional data-conditioning transformations might include moving average calculations and certain logarithmic calculations on the stimulus data.

It is very inappropriate to identify as a market stimulus a time series that doubles as both an independent and a dependant variable and then suggest that additional market stimuli can be derived from the dual-purpose stimulus. For example, it is not valid to introduce a T. bond time series, moving average manipulations on T. Bonds, RSI calculations on T. Bonds, and perhaps a moving average convergence-divergence (MACD) stimulus on T. Bonds to predict future T. Bond prices.

The result in the above intractable event would be little different from a standard technical analysis of T. Bonds where one would rely on the basic assumption that past price determines future price. Neural networks could be attempted in such a scenario, but the training/test cycle would be no more valid there than in the old style traditional technical analysis exercise, where market performance is based on hindsight.

Neural network technology, as applied to financial markets, is moving forward at a fast pace. With the flurry of recent interest, overzealous innovators may unknowingly formulate flawed systems and sell them before bad assumptions and errors in judgment are detected. If you are considering the purchase of a neural network system, be sure that the critical subject of input data is covered in the documentation, and most importantly, understood by the developer. We have presented our views on this subject so that readers may be more knowledgeable and selective when evaluating such products and investigating this new technology. ♦

Bob Pallatier

Ask Customer Service

Each month in this column the Customer Service staff addresses a topic of interest to many CSI subscribers in a question-and-answer format. This month, they discuss the various data formats supported by QuickTrieve.[®]

Q. *I use CompuTrac software for analysis of my stocks and commodities. QuickTrieve stores my data in the proper format automatically, but I also keep a QuickTrieve-format copy of all my files. I'm concerned I that I may be wasting too much space. Do I really need to keep a redundant set of QuickTrieve files that I'm not using?*

A. It is possible that you'll never need the QuickTrieve-format data files. But then again, it's likely that they could come in handy some day. For example, if you ever question a price value in a CompuTrac data file, your CSI customer service representative will probably ask you to verify the value in your QuickTrieve file. Sometimes if a file won't plot in CompuTrac, we'll ask you to try it with QuickPlot[®] so we can pinpoint the problem. Some other uses for CSI-format files are addressed below.

Q. *I use QuickTrieve for data retrieval, but store my data files in just the CompuTrac format. I recently tried to extend my historical data for a stock index several years earlier than my existing history file. I ordered and retrieved the data from CSI, then distributed the data to my files normally. The new data transferred just fine, but it wiped out the later dates that were stored in the file! What happened and how can I prevent this from happening in the future?*

A. Unlike a QuickTrieve-format file which reserves file space for each possible trading day within the file's date range, a CompuTrac- (Metastock) format file does not hold empty spaces for filling in data after-the-fact. Putting an earlier date range into an existing

file will always result in overwriting your existing data! The way to avoid this is to merge the date ranges in a QuickTrieve-format file and then convert the entire file to CompuTrac. If you don't have a QuickTrieve-format file of your existing data, first convert your CompuTrac file to CSI format. Then add the new data to the CSI-format file. You can then convert the entire file back to CompuTrac format through QuickTrieve without losing any data.

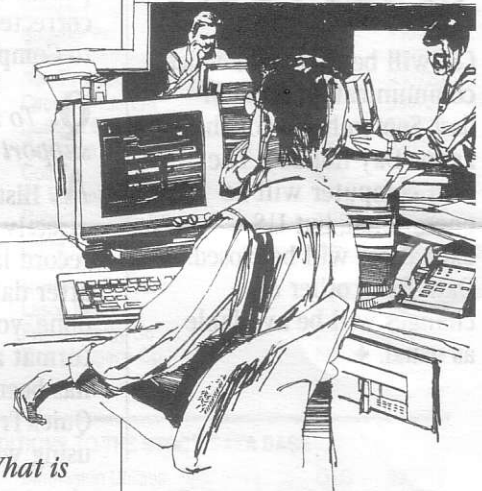
Q. *I find that whenever I try to fill in a missing day in my CompuTrac-format file, I end up deleting the following day. What is the problem?*

A. Just like adding a previous time period, filling gaps in a CompuTrac-format file will result in overwritten days. The solution is to fill missing dates in QuickTrieve format and then convert the entire QuickTrieve file to CompuTrac format. Better yet, avoid missing days by always using the MULTIPLE DAYS collection calendar for data retrieval. Select <F3> All Uncollected days for each update session to reduce the risk of missing an update.

Q. *I have many CompuTrac-format files from another source that I would like to continue updating. Can I do this through CSI with QuickTrieve?*

A. Probably so. QuickTrieve must first tag your CompuTrac format files so that they can be located and read by QuickTrieve. Use QuickManager's[®] PROCESS ALTERNATE FORMAT FILE for this. The files should update normally after that. However, we would strongly recommend that you pass the data through QuickManager's DATA INTEGRITY CHECKER before proceeding. To do this, convert the

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Ask Customer Service

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Holiday NEWS

CSI will be closed for voice communication on Monday, September 6 for the Labor Day holiday. The host computer will be operational, but U.S. exchanges will be closed. Data from other exchanges will be available as usual. ♦

processed CompuTrac-format files to QuickTrieve format. Then let the data integrity checker search for missing, duplicate and suspicious data points. Once your files have been corrected, you can convert them back to CompuTrac format.

Q. To what extent does QuickTrieve support ASCII file conversion?

A. Historical data can be distributed directly to ASCII files with a standard record layout directly from disk or after data retrieval. When this is done, you can avoid using the CSI format altogether. However, if data has been distributed to CSI format, QuickTrieve can create ASCII files using whatever record layout you

specify. The conversion is done through the CONVERT FILE TYPES menu selection. It is not carried out automatically during daily update distributions. This utility can convert an entire file, append *x* days or append the last day to your existing ASCII files. Recent QuickTrieve versions can also convert data from ASCII to CSI format.

Q. I would like to be able to save my data files to disk and print them on another computer without installing QuickTrieve. How can I do this?

A. Simply convert the desired files to ASCII through QuickManager's CONVERT FILE TYPES feature. To print your ASCII file, type COPY filename.PRN PRN. ♦



CSI Software Product Summary

- QuickTrieve®/QuickManager®** - To retrieve, manage & edit data; includes Alert Calendar: Unrestricted use \$99, Daily data user \$39 and 4.04 Upgrade \$29
- QuickPlot®/QuickStudy®** - Charting & analysis software (requires QT/QM) \$156 Currently on sale @ \$99
- Trade Data Manager™** - Macintosh downloader & accounting program \$59; upgrade \$49 or *FREE* with \$100 history order.
- Trading System Performance Evaluator™ (TSPE)** - Computes your system's capital requirements \$199
- Trader's Money Manager™** - Introductory price \$499 (includes TSPE)
- TraDesk™** - Traders' complete accounting system-(price varies with number of accounts) Starting @ \$399/Unrestricted use \$299/Daily data user or 12-month lease starting @ \$22/Mo.
- Seasonal Index Value Pack** - Ten years of history for 33 popular commodities \$444
- Daily Updates** - Starting at \$10.80 per month
- CSI Technical Journal** - Aug. 1990 to present \$35/Yr. or \$5/Reprint
- CSI Mailing List** - \$200/1,000 names (CSI users omitted)
- CSI Product Catalog** - *FREE*

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