NEURAL NETWORKS VS. CONVENTIONAL METHODS OF FORECASTING

By Chin Kuo and Arthur Reitsch

In neural networks one does not need to specify the nature of relationship, linear or curvilinear, that exists between input and output data ... one can specify more than one variable... neural networks tend to do better than conventional models.

The purpose of this article is to present an overview of the neural network forecasting procedure, and to compare the forecasting accuracy of neural networks with several conventional forecasting models (time series and regression). As will be shown, neural networks provide a superior method of forecasting in almost all cases. Two data sets generated four different forecasting problems which were used for forecasting comparisons.

A number of forecasting models have been developed over the past several years, with many of them finding their way into regular use by practical forecasters. Popular techniques include regression analysis, time series decomposition, moving averages and smoothing methods, the Box-Jenkins methodology, and numerous judgmental methods.

Conventional forecasting models rely on historical data to develop a model and use it to project the variables of interest. In these models, it is assumed that the future will be exactly like the past, except for those variables specifically used by the model to develop a forecast. Conventional models sometimes make assumptions about the form of population distributions, assumptions that may or may not be subject to verification. Regression models, for example, assume that the underlying population follows a normal distribution.

The developing field of artificial intelligence attempts to duplicate the processes of the human brain and nervous system using the computer. While this field originated in biology and psychology, it is rapidly advancing into other areas including business and economics. The three main thrusts of artificial intelligence are language processing, robotics, and artificial neural networks. This latter field has the most commercial applications, including forecasting.

In neural networks, many relevant examples are programmed into the computer, examples that capture the full range of past relationships among all variables that might affect the outcome of the dependent variables. This procedure is analogous to the collection of a significant sample size in conventional statistical analysis. The neural network program then assimilates these examples and attempts to develop the underlying relationships by "learning" as it goes along. This learning process is also called "training" and is quite analogous to a human trainee learning on the job.

A few forecasting researchers have noticed the similarity between neural network techniques and conventional

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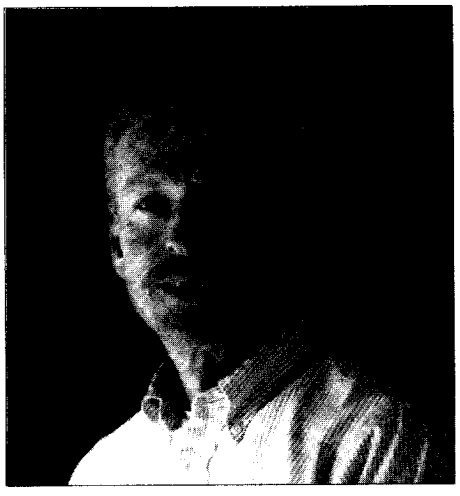

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