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# NEURAL NETWORKS IN FORECASTING AND DECISION MAKING

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## ABSTRACT

Neural networks (NN) have been widely touted as solving many forecasting and decision modeling problems. For example, they are argued to be able to model easily any type of parametric or non-parametric process and also automatically and optimally transform the input data. Also, they are easy to embed in information systems and they can "learn" how to perform simple forecasting and decision making tasks without human input. Our research-in-progress evaluates these claims.

We will spend the first half of the session reviewing our work comparing neural networks to classical techniques in time series forecasting, regression-based causal forecasting, and regression-based decision models. In the second half of the session, we will discuss the art and science of building these models.

In Hill, O'Connor and Remus (1992), time series forecasts based on neural networks were compared with forecasts from six statistical time series methods (including exponential smoothing and Box-Jenkins) and two judgment-based methods; we did this for 111 real financial time series. The classical methods were all estimated by experts. Across all series, the neural networks did better than or as good as statistical and judgment methods.

In Marquez et al. (forthcoming), data representing three common bivariate functional forms used in causal forecasting (linear, log-linear, and reciprocal) were generated and the performance of the neural network models was compared against the true regression model across differing functional forms, sample sizes, and noise levels. The results showed that neural network models perform within 2% of the mean absolute percentage error (MAPE); this is very good performance in the real world. This work is continuing as Marquez studies issues such as the vulnerability of neural networks and regression to multicollinearity, outliers, and other data problems.

In Remus and Hill (forthcoming), the production scheduling decisions as modeled by neural networks and regression-based decision rules for sixty-two decision makers were compared. Neural network models performed as well as but not better than those using the linear regression models. In Hill and Remus (forthcoming), the above research was continued and composite neural network models were estimated. The neural networks performed better than both the classical models and neural networks from the earlier study. The composite neural network also performed at least as well as classical composite models.

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