THE UNIVERSITY OF CHICAGO | **DEPARTMENT OF STATISTICS**

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Abstract

In this paper, we review recent developments in hybrid time series forecasting models and evaluate their accuracy on two contrasting time series datasets: one being a long-term series with a primarily linear trend and the other a nonlinear short-term series. The models are divided into two categories. The first category contains models that are based on traditional statistical techniques integrated with machine learning, like Zhang's ARIMA-ANN model,RF/OLS model and the LASSO/RF model. Group two includes those purely utilizing machine learning algorithms such as CNN-LSTM. This approach helps us understand the predictive capabilities of different hybrid models across varying types of time series data and build arguments on the assessment concerning the benefits and limitations of pure machine learning models against hybrid models that integrate traditional statistics with machine learning. At the same time, comparing the two different samples also gives us ideas about when to use these hybrid models. Hybrid models that only use machine learning are not good for time series without strong seasonal patterns. But hybrid models that include statistical methods work better in this kind of situation.