TIME SERIES FORECASTING COMPETITION AMONG THREE SOPHISTICATED PARADIGMS

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ABSTRACT

This paper is focused on assessing the performance of three kinds of forecasting paradigms: Dynamic Linear Models (DLM), Artificial Neural Networks (ANNs) and Autoregressive Integrated Moving Average models (ARIMA) in time series forecasting. We continue the work of Makridakis and Hibon's M-3 forecasting algorithm competition, a large scale project to assess how various forecasting algorithms perform on 3,003 real world time series. Our purpose is to find out how the different types of time series affect the forecast accuracy of these paradigms. In addition, we try to find a guideline about how to select a forecasting model subject to the data characteristics and how to make a model fit the time series data through adjusting the model structure and parameters. Statistics accuracy measures: Symmetric Mean Absolute Percentage Error (SMAPE) and Mixed Linear Model are employed to evaluate and compare the competition results. The results show that: different paradigms perform different based on time series category; statistically sophisticated paradigms, e.g. ANNs, produce better forecast accuracy then simple paradigms in monthly time series; the length of the time series affect the ANNs performance; complex DLM models are not necessarily better than simple DLM models in forecasting. We provide a guide line for selecting a paradigm in forecasting with respect to the time series characteristic and the forecast requirement.

DEDICATION

This thesis is dedicated to my wife Yuan and my newborn baby Anna.

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