

# Do we need Experts for Time Series Forecasting?

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**Abstract.** This study examines a selection of off-the-shelf forecasting and forecast combination algorithms with a focus on assessing their practical relevance by drawing conclusions for non-expert users. Some of the methods have only recently been introduced and have not been part in comparative empirical evaluations before. Considering the advances of forecasting techniques, this analysis addresses the question whether we need human expertise for forecasting or whether the investigated methods provide comparable performance.

## 1 Introduction

Time series forecasting has been an active area of research in the last decades. Numerous competitions and studies have been carried out, three extensive and recent ones are described in [1], [2] and [3]. Makridakis and Hibon present the results of a forecasting competition with 3003 time series in [1]. They found that complex models do not necessarily outperform simple ones, that forecasting performance depends on the accuracy measure and the forecasting horizon used and that combinations of forecasts outperform individual methods on average. Stock and Watson conducted an extensive study using 215 U.S. macroeconomic series in [2], comparing 49 linear and nonlinear forecasting methods with no clear-cut winner. Teräsvirta et al. re-examine the nonlinear methods used in [2] with different model parametrisation in [3], still with non-conclusive results.

In all of these studies, forecasting experts spent time and knowledge designing and tuning methods with different degrees of complexity only to come to the same conclusion: No single best method that works well on all time series can be identified. Consequently, in practical applications, one would need forecasting experts to investigate specific time series and suggest a forecasting model. However, the fact that experts with sufficient application-specific and forecasting expertise are mostly rare and expensive leads to the question of how much loss in forecast accuracy one might expect from failing to consult experts, but using off-the-shelf methods instead. This work provides an empirical comparison of one-step-ahead and multi-step-ahead forecasting methods that might be chosen by users who are not forecasting experts. Results are compared with outcomes of a recent forecasting competition ([4]).

The paper is organised as follows: Sections two and three introduce individual forecasting methods and forecast combinations investigated here. Section four describes methodology and results of the empirical study, section five concludes.

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