A Trend Based Forecasting Framework of the ATA Method and Its Performance on the M3-Competition Data

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Abstract : It is difficult to make predictions especially about the future and making accurate predictions is not always easy. However, better predictions remain the foundation of all science therefore the development of accurate, robust and reliable forecasting methods is very important. Numerous number of forecasting methods have been proposed and studied in the literature. There are still two dominant major forecasting methods: Box-Jenkins ARIMA and Exponential Smoothing (ES), and still new methods are derived or inspired from them. After more than 50 years of widespread use, exponential smoothing is still one of the most practically relevant forecasting methods available due to their simplicity, robustness and accuracy as automatic forecasting procedures especially in the famous M-Competitions. Despite its success and widespread use in many areas, ES models have some shortcomings that negatively affect the accuracy of forecasts. Therefore, a new forecasting method in this study will be proposed to cope with these shortcomings and it will be called ATA method. This new method is obtained from traditional ES models by modifying the smoothing parameters therefore both methods have similar structural forms and ATA can be easily adapted to all of the individual ES models however ATA has many advantages due to its innovative new weighting scheme. In this paper, the focus is on modeling the trend component and handling seasonality patterns by utilizing classical decomposition. Therefore, ATA method is expanded to higher order ES methods for additive, multiplicative, additive damped and multiplicative damped trend components. The proposed models are called ATA trended models and their predictive performances are compared to their counter ES models on the M3 competition data set since it is still the most recent and comprehensive time-series data collection available. It is shown that the models outperform their counters on almost all settings and when a model selection is carried out amongst these trended models ATA outperforms all of the competitors in the M3- competition for both short term and long term forecasting horizons when the models' forecasting accuracies are compared based on popular error metrics.

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