HYBRID MODELS FOR TIME SERIES FORECASTING

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A project report submitted

in partial fulfillment of the requirement for the award of the degree of

MASTER OF ARTS

IN

FINANCIAL ECONOMICS

May 2024

MADRAS SCHOOL OF ECONOMICS

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ABSTRACT

Time series forecasting remains crucial across various fields, utilizing traditional statistical models and machine learning algorithms to predict future trends with reasonable accuracy based on historical data. Recent advancements have introduced more sophisticated approaches, including hybrid models, to enhance forecasting precision. However, developing generalized forecasting models is challenging due to the specialized nature of data streams, with existing models often tailored to specific domains like foreign exchange, stock markets, and energy consumption. This study addresses the need for a versatile forecasting model applicable to both agriculture and energy data. We propose two hybrid models designed to optimize forecasting accuracy while managing computational complexities. Our methodology involves experimental comparisons between individual models and hybrid models to determine their optimal order and suitable models for post-processing. The results indicate that a simple hybrid is unsuitable for post-processing and should be positioned at the beginning of a series model. Furthermore, the experiment demonstrates that MLP (Multilayer Perceptron) excels at post-processing residuals even within hybrid models. Overall, the proposed models consistently outperform individual best-performing models such as ARIMA (AutoRegressive Integrate Moving Average) and LSTM (Long Short Term Model) in normal times, with one model showing superior performance even during stressed periods like the COVID-19 pandemic.

Keywords: Time series forecasting, ARIMA, LSTM,MLP, Agriculture, Energy