AN ENSEMBLE MACHINE LEARNING MODEL FOR INFLATION FORECASTING

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ABSTRACT

Forecasting inflation is an important task for various reasons. It can be used for the central banks to make effective economic and monetary policies to stabilize a country's economy. It can be also useful for the companies to plan their budgets, productions, business strategies and to make short-term and long-term decisions. While forecasting inflation is important for organizational level it can be also useful for the public as well. For an example, investors have a crucial effect on inflation and forecasting inflation plays a vital role in their investment decisions. Because investors assess the future value of their investments which the risk associated with inflation. Furthermore, forecasting inflation can be useful also for the household budgeting that helps them to plan their budgets and make decisions about their spending and savings.

While forecasting inflation is an important task, finding a reliable model for long-term forecasts is still an open question. To address this problem ensemble techniques have been assessed to produce a reliable model. Author has analyzed various models and selected DeepAR, Prophet and LSTM models to implement the ensemble model, based on their ability to capture the seasonality and to detect complex past data patterns. LSTM model have been widely used in the past literature while the Prophet model is only used few past works related to the domain. However, the DeepAR model has never been evaluated in the inflation forecasting domain.

The designed ensemble model has given better results compared to each individual machine learning model. Root mean square error (RMSE), Mean square error (MSE), Mean absolute error (MAE), Mean absolute percentage error (MAPE) and R-square metrics have been used to test the each model's accuracy. And the ensemble model shows the lowest error compared to each individual models and shows R-square value of 0.9305. A web application prototype has been also implemented to display the forecast results and several interactive features has been added to improve the end-user experience. Machine learning component is implemented using python. And for the backend, Python is used with Flask framework and React.js is used for frontend.

Keywords: Ensemble Learning, Machine Learning, Time-series Analysis, DeepAR, Prophet, LSTM, Inflation Forecasting

ACM Subject Descriptors: Computing methodologies → Machine learning → Machine learning approaches → Neural networks