

# MSC Project

Ensemble learning model to predict the Sri Lankan stock  
market index using macroeconomic variables

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## Abstract

The stock market plays an important role in the economy of a country. In Sri Lanka the Colombo Stock Exchange (CSE) is the only market that investors can trade. Institutional investors and individual investors make a fortune through this medium. However, this is not always assured due to the volatile nature and the risks involved in the market. The current instability in the market due to the economic crisis, has caused many of the investors who are bearing a huge loss to leave the market immediately. Thus, the stock market indexes also started to drop creating a negative sentiment towards the market. In order to allow the investors to make informed decisions and retain them in the stock market, this research proposes an ensemble learning model to forecast the ASPI and the S&P SL 20 index, based on the macroeconomic factors of Sri Lanka. Sri Lanka being a third world country has different macroeconomic factors that impact the stock market when compared to other leading countries. Through this research the most impacting factors have been identified to be used in the process of forecasting.

Ensemble models have always promised to give better results than standalone model. The ensemble model presented in this research combines a stacked LSTM model, LightGB model and a GRU model to forecast the indexes and finally is passed through a SVR to obtain the final forecast. In order to select the best combination of models, LSTM, stacked LSTM, BiDirectional LSTM, XGBoost, Light GB, RNN were trained individually. The models that provided lower RMSE were selected for the final ensemble model. This combination of models provides a RMSE value of 90.90% which is higher than any of the stand-alone models. This ensures that a much accurate value is predicted, helping the investors to make better investment decisions.

**Key words :** Stock Market, Colombo Stock Exchange (CSE), Macroeconomic factors, Ensemble model, LSTM, LightGB, GRU, SVR