

**FORECASTING ASPI USING ARTIFICIAL NEURAL
NETWORKS (ANNs) AND COMPARISON BETWEEN
ANN ARCHITECTURES ON FORECASTING**

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Abstract

The stock market plays a significant role in a country's economy as it directly impacts the mobilization of money in the economy. Recently, researchers and analysts have built various models to forecast the stock markets. However, Artificial Neural Networks (ANNs) have performed significantly better than the traditional statistical models for forecasting the stock market. Therefore, this study was carried out to compare the performance of two ANN architectures named Long Short-Term Memory (LSTM) recurrent neural network and Convolutional Neural Network (CNN) to forecast the All Share Price Index (ASPI) of the Colombo Stock Exchange (CSE).

The independent variables used for the study are exchange rate, gold price, crude oil price and 12 months Sri Lanka Inter-Bank Offered Rate (SLIBOR). The daily data of the ASPI and four independent variables were obtained from reliable web sources for a period of 8 years starting from 1st July 2011 to 30th June 2019. Several techniques in R statistical package was used to match the time frames and clean the dataset. The final dataset consisted of 1912 data points for the analysis.

In this study, initially, a descriptive analysis was carried out to identify the relationship between ASPI and the other four independent variables. For this purpose, the cross-correlation test was used and the test results revealed that all four independent variables have weak negative relationships with the ASPI. Further, it took 1 day and 6 days respectively for the ASPI to react to any change in the gold price and crude oil price respectively.

In the advanced analysis, two ANN models were fitted using the python programming language to forecast the ASPI of the CSE. Both LSTM and CNN architectures provided better prediction accuracy. The Root Mean Squared Error (RMSE) values obtained for LSTM and CNN models are 38.35 and 69.99 respectively. According to the RMSE value, it was identified that LSTM architecture can forecast the ASPI of the CSE significantly better than the CNN architecture.

Therefore, it is recommended to use the LSTM architecture to forecast the ASPI of the CSE. However, a hybrid architecture of both LSTM and CNN architectures is needed to have better prediction accuracy.