

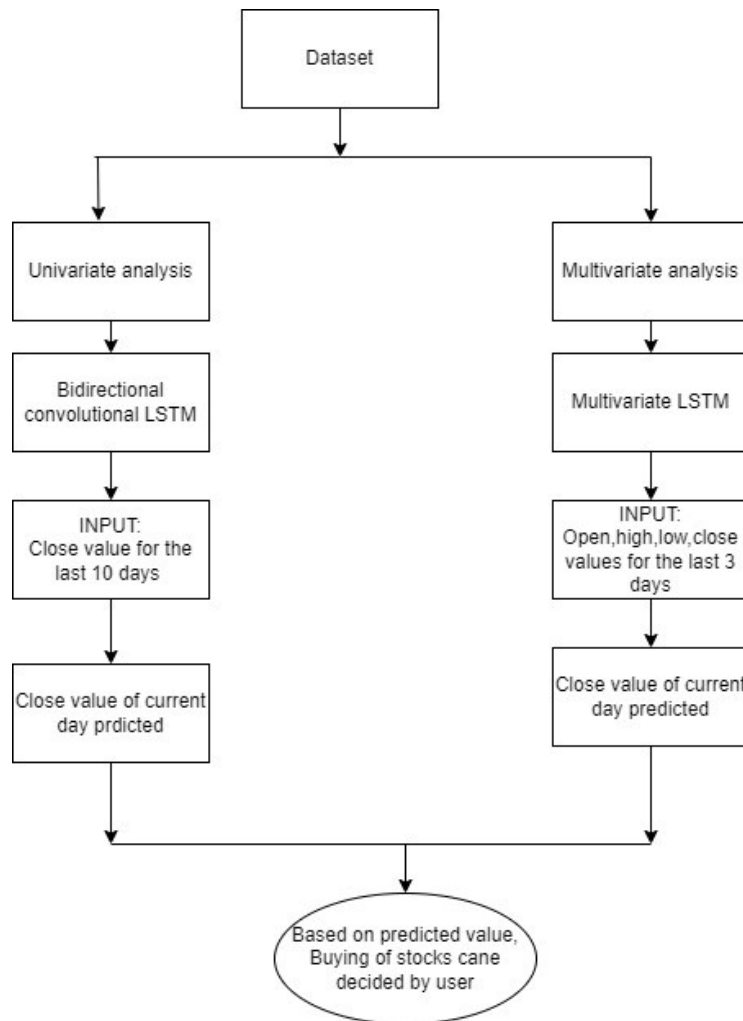
STOCK PRICE FORECASTING

INTRODUCTION

Forecasting stock market prices has always been a challenging task for many business analysts and researchers .Stock market prediction is the act of trying to determine the future value of a company stock .The successful prediction of a stock's future price could yield significant profit. The efficient-market hypothesis suggests that stock prices reflect all currently available information and any price changes that are not based on newly revealed information thus are inherently unpredictable. The rate of an investment and business opportunities in particular Stock Market can increase if an efficient algorithm could be devised to predict the short-term price of an individual stock.

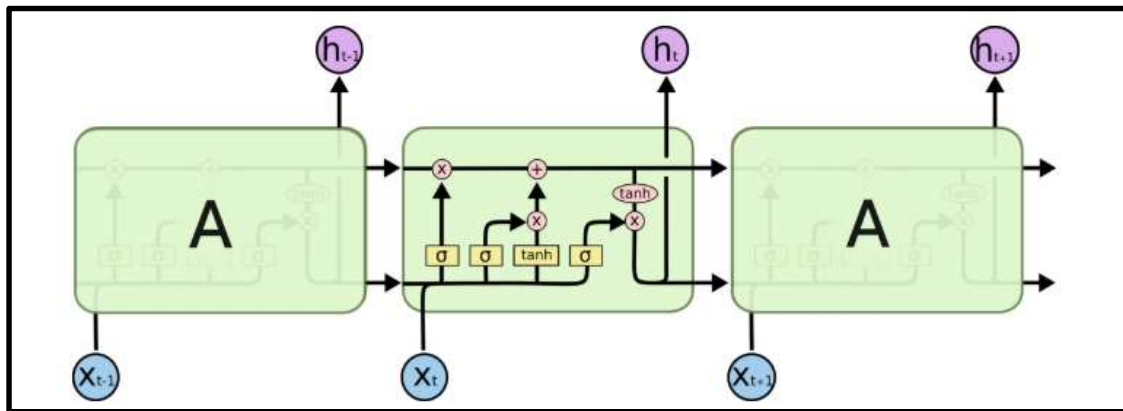
PROPOSED METHOD

The proposed idea is to come up with a model to predict the close value of the next day given the stocks of all days until the current day, and also develop a front-end UI that can help to invest the right amount of money. The various machine learning models such as Univariate Bi-directional ConvLSTM And Multivariate LSTM are used for forecasting the close value of the next day given the stocks of all days until the current day.



WORK AND RESULTS

Long Short-Term Memory (LSTM) networks are a type of recurrent neural network capable of learning order dependence in sequence prediction problems. The LSTM model will learn a function that maps a sequence of past observations as input to an output observation. As such, the sequence of observations must be transformed into multiple examples from which the LSTM can learn. Also the model passes the previous hidden state to the next step of the sequence. Therefore holding information on previous data the network has seen before and using it to make decisions.



LSTM Cell

The ConvLSTM is a type of recurrent neural network for spatio-temporal prediction that has convolutional structures in both the input-to-state and state-to-state transitions. The ConvLSTM determines the future state of a certain cell in the grid by the inputs and past states of its local neighbors. The ConvLSTM was developed for reading two-dimensional spatial-temporal data, but can be adapted for use with univariate time series forecasting. We can define the ConvLSTM as a single layer in terms of the number of filters and a two-dimensional kernel size in terms of (rows, columns). The output of the model must then be flattened before it can be interpreted and a prediction made. Bidirectional LSTMs are an extension of traditional LSTMs that can improve model performance on sequence classification problems. The Bi-Directional Conv LSTM is nothing but a Bi-Directional LSTM with convolution layers.

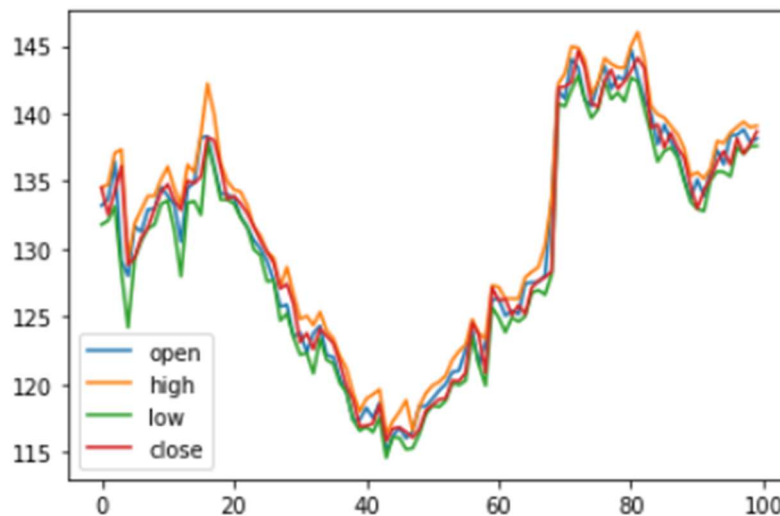
Also multivariate models can also be used for prediction. Multivariate time series data means data where there is more than one observation for each time step. There are two main models that we may require with multivariate time series data:

- Multiple Input Series.
- Multiple Parallel Series

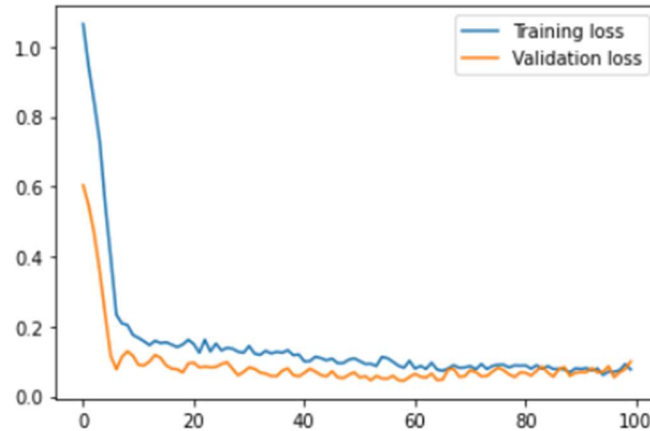
An LSTM model needs sufficient context to learn a mapping from an input sequence to an output value. LSTMs can support parallel input time series as separate variables or features. Therefore, we need to split the data into samples maintaining the order of observations across the two input sequences. In this approach , multiple input series is used.

After analyzing it is found that for Univariate analysis, Bi-Directional ConvLSTM perform well .For multivariate analysis, the normal LSTM is used. All these models are trained with the dataset provided .Then a webpage is developed from where the stock price of the previous days is collected and they are used to predict the stock value of the next day. The final results are shown in the webpage.

The below is the training graph for various features such as open, high, close, low to examine the multivariate LSTM.



Also the training loss and validation graph is plotted to check the performance of multivariate LSTM



CONCLUSION

The Univariate Bi-Directional LSTM and Multivariate LSTM is used to predict the future stock price based on the previous date's information. Also a User Interface(here a web page) is developed to make this idea user friendly. For Univariate, the stock price of the previous ten days is collected from user and price of stock on particular day is shown in the webpage. For Multivariate, the previous three days' stock price and the required features for all those three days are collected from user and price of the stock on particular day is displayed in the webpage. By seeing the price displayed on the webpage the user can be able to decide whether to buy the stock or not on that particular day.