Stock Price Prediction using LSTM

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***Abstract*—This project involves the use of the LSTM (Long Short Term Memory) Neural Network for the prediction of closing prices of stocks. LSTM is an artificial recurrent neural network (RNN) architecture. The model is run on the stock data of the Tata Global Stock for which the accuracy of the model is calculated and the predicted and known values of closing prices of the test data are plotted.**

***Index Terms*—LSTM, RNN, Stock Price**

I. Introduction

Stock trading is the act of buying and selling stocks at particular times so as to make money off the variation in stock prices. This project aims at predicting the closing prices of stocks with the help of a Recurrent Neural Network algorithm called LSTM (Long Short Term Memory). This is a feedback neural network and can train and predict entire sequences of data which makes it suitable to work on sequences of stock data.

II. LSTM

The traditional RNNs had the problem of vanishing gradients and LSTM was the algorithm made to eliminate this problem. LSTM is a feedback RNN and an LSTM unit contains a cell, an input gate, an output gate and a forget gate. The cell has the ability of remembering values over arbitrary time intervals and this helps LSTM in working of whole data sequences. The input, output and forget gates modulate the flow of data in and out of the cell.

LSTM is great at the processing, classification and predictions of time series data. Time series data is basically data that is arranged as a series in the order of time. All this suggests that LSTM is a suitable algorithm for stock price prediction.

III. Methodology

The LSTM model was built using the Keras library. From the Keras library, the Sequential module was imported with the purpose of initializing the neural network, the Dense module was imported in order to add a densely connected neural network layer, the LSTM module was imported to add the Long Short-Term Memory layer and the Dropout module was imported to add dropout layers that preclude overfitting.

The LSTM layer had these arguments:

1) 50 units - the output space's dimenionality.
2) return_sequences=True - decides if the last output in the output sequence is to be returned or the full sequence is to be returned.
3) input_shape - shape of the training set.

Dropout layers were stated as 0.2 which drops 20% of the layers. The Dense layer was added with the output stated to be 1 unit. The model was then complied used the adam optimizer and the loss is set as the mean_squared_error.

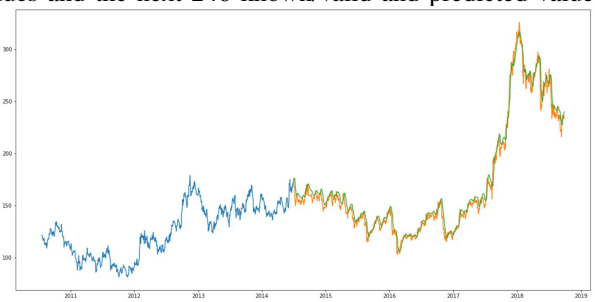
IV. Results

The model was run for using the past 60 closing price values to predict the next 246 closing prices.

The accuracy was calculated by dividing the predicted closing price by the known value and multiplying by 100. In this case, if the predicted value is lesser than the known value, the accuracy value will be below 100% and the accuracy will decrease with decreasing predicted value with the corresponding accuracy value decreasing and if the predicted value is greater than the known value, the accuracy value will be greater than 100% and the accuracy will decrease with increasing predicted value with the corresponding accuracy value increasing. So, as the accuracy value approaches 100% from either side, the accuracy increases.

The calculated accuracy came out to be 101.85% which is really good as it is very close to 100%. Thus, the model is working very well for the given data.

The stock chart was plotted containing the initial 60 training values and the next 246 known/valid and predicted values.



The blue line represents the 60 training values and the orange and green lines represent the 246 known/valid values and predicted values. It can be observed that the valid values and predicted values are very close and the stock closing price is being predicted very well.

Thus, the results show that the LSTM model is working very well for the given stock data.

V. Conclusion

LSTM was used to make a Machine Learning model to predict the future closing prices of stock data using the

previous known closing prices. The model was run on TATA GLOBAL stock data and produced great results. The accuracy came out to be 101.85% which is very good and is greater than 100% because the predicted prices were higher than the known prices on an average. The predicted and known prices were plotted and it was seen that they were very close again indicating that the model is working very well for the given data. Thus, the model was found to be performing great for the stock data used.

REFERENCES

[1] https://link.springer.com/article/10.1007/s10462-020-09838-1
[2] https://www.sciencedirect.com/science/article/pii/S1877050920304865
[3] https://www.researchgate.net/publication/348390803_Stock_Price_Prediction_Using_LSTM
[4] https://en.wikipedia.org/wiki/Long_short-term_memory