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Stock Market Prediction Using Machine Learning

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ABSTRACT
The use of Neural networks has found a variegated field of applications in the present world. This has led to the development of various models for financial markets and investment. This paper represents the idea how to predict share market price using Artificial Neural Network with a given input parameters of share market. Artificial Neural Network can remember data of any number of years and it can predict the feature based on the past data. This paper makes use feed forward architecture for prediction. The network was trained using ten year data. It shows a good performance for market prediction. The network selected though was not able to predict exact value but it succeeded in predicting the trends of stock market.

General Terms
Stock Market Prediction, Machine Learning.

Keywords
Neural Networks, Machine Learning, Tensor flow.

1. INTRODUCTION
The previous three decades has seen that share market prediction has become a good topic for research. Many researchers have given their idea how to predict share price with more accuracy. There are different methods that have been applied in order to predict Share Market returns. During the last decade, Artificial Neural Networks have been used in share market prediction.

The share market is dynamic in nature means to predict share price is very complex process by general prediction or computation method. Its main reason is that there is no linear relationship between market parameters and target closing price. Since there is no linear relationship between input patterns and corresponding output patterns, so use of neural network is a choice of interest for share market prediction. Because this network in training phase learns about situations affecting share market price in a given environment. And this learnt knowledge stored in given network is used for predicting future market price.

Here we have used data set of Google Inc. and Amazon from January 1, 2017 to January 31, 2018 for training and prediction. Considered input parameters for prediction are open, high, low, adj. close and volume. Back propagation algorithm is used for training and for learning we used different functions that are named in later section. Comparison represents the effect on performance while altering number of levels and number of neurons in given layer.

2. PREVIOUS WORKS
There have been many attempts made in the past to develop a system to accurately predict the stock market in real time. One of the first such projects was by Kimoto et al. who had used ANN for the prediction of Tokyo stock exchange index. Minzuno et al. applied ANN again to Tokyo stock exchange to predict buying and selling signals with an overall prediction rate of 63% in 1998. So, predicting the stock market is something which has been attempted a lot of times. Currently, there are multiple platforms which do the same. Day traders rely on this system to make tactical and strategic investments for gaining maximum profits. In India, the best example is IQ option and Tradingview, which provide a great interface for traders to work on. We are attempting to develop a similar system, wherein we would provide a proper analysis of each stock the trader wants to view.

3. Proposed System

3.1 System Architecture
We have developed a system wherein we use Neural Network to train the model for the past year database. We are using Recurrent Neural Network which uses

LSTM (Long Short Term Memory) technology and backpropogation for training the model. The trained model upon testing gives the predicted high values for the next week.

Artificial Neural Networks (ANNs) are most often chosen for its ability to generalize results from unseen data, especially for dynamic systems on real time basis. ANNs are parallel computational models comprised of densely interconnected adaptive processing units. These networks are fine grained parallel implementations of dynamic systems. ANNs can identify and learn correlated patterns between input data sets and corresponding actual target values. ANNs are networks of highly interconnected neural computing elements that have the ability to respond to input stimuli and to learn to adapt to the environment. ANN includes two working phases, the phase of learning and that of recall. During the learning phase, known data sets are commonly used as a training signal in input and output layers.

3.2 Process

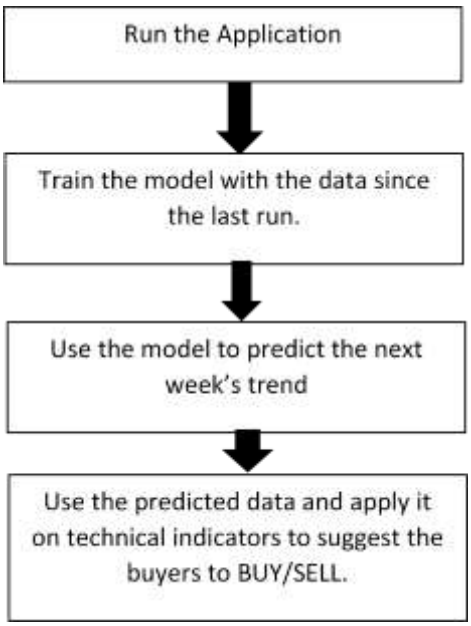

Fig 1 : Basic Steps

3.3 Training

It is the process where network is in learning phase during which network stores knowledge. This knowledge is used by the system to predict future output based on input parameters. Here weights and biases related to each neuron are changed iteratively to converge to suitable value. In the training model, we provide the historic database (1 year) to the Neural Network. This training model is the base for testing the data for prediction.

3.4 Testing

The testing phase tests the stock data (7 days) on the trained model. It produces the predicted high values for each day. The training model is run on the testing data and the predicted high values are generated by the NN. The figures Fig. 3(a) and Fig 3(b) shows the testing results on the Amazon and Google stocks.

3.5 Technical Indicators

Technical indicators are some indicators generated from the historic values of the stock by analyzing a particular trend. A simple formula generates the Technical indicator values. These values are compared with the predicted values generated by the testing model. This comparison gives us an indication whether we should buy or sell the stock. The technical indicators we have used are SMA (Simple Moving Average) and RSI (Relative Strength Index). The SMA gives a simple average for the day for the past 20 days and the RSI gives us an indication when the stock is being overbought or oversold.

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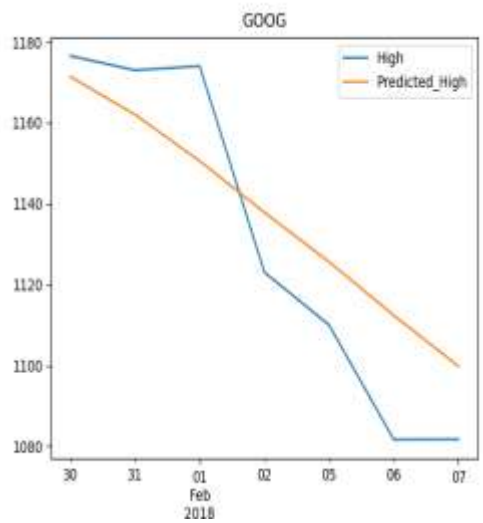

Fig 3(a): Implementation Result

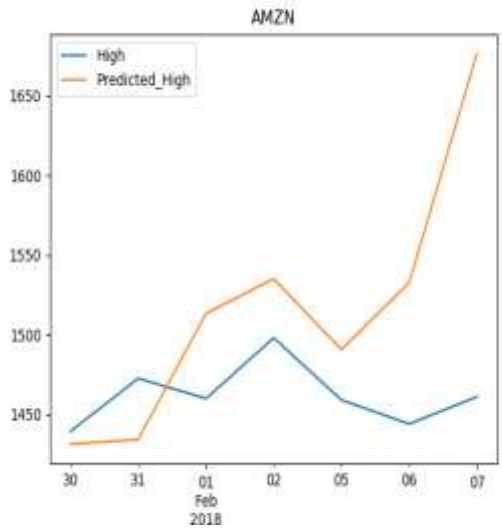

Fig 3(b): Implementation result

4. Result

Table 1 and Table 2 show the results of our implementation.

Table 1. Testing Result

GOOGLE

Date	High	Predicted High
2018-01-30	1176.520020	1171.385254
2018-01-31	1173.000000	1162.027710
2018-02-01	1174.000000	1150.549316
2018-02-02	1123.069946	1137.841919
2018-02-05	1110.000000	1125.634155
2018-02-06	1081.709961	1112.384033
2018-02-07	1081.780029	1099.830322
Accuracy = 71%		

Table 1. Testing Result

AMAZON

Date	High	Predicted High
2018-01-30	1439.250000	1431.330933
2018-01-31	1472.579956	1434.168701
2018-02-01	1459.880005	1513.246948
2018-02-02	1498.000000	1535.099731
2018-02-05	1458.979980	1490.616455
2018-02-06	1443.989990	1532.688477
2018-02-07	1460.989990	1676.486694
Accuracy = 70%		

4.1 Result Analysis and Conclusion

From the results, it is evident that the model is predicting the high value of the stock quite accurately. The mean square error in the predicted high as compared to the original value is pretty low. The graphs are almost identical. Considering the change in the high value from the previous day, i.e. increase or decrease in the high value, we check the performance of the model by taking similar comparisons. Such a comparison gives us an accuracy of around 70% for both models which is considered as pretty good considering that this project is predicting daily values for the stock market.

5. ACKNOWLEDGMENTS

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