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A Machine Learning Model for Stock Price Prediction using Neural Network

Ankita Kadole[1]

Student, Dept. of Computer Science and Engineering, KLECET, Karnataka, India

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Abstract - *Stock market prediction is the act of trying to determine the future value of a company stock or other financial instrument traded on a financial exchange. The successful prediction of a stock's future price will maximize investor's gains. A neural networks based model have been used in predicting of the stock market. Artificial neural network (ANN) or connectionist systems are computing system vaguely inspired by the biological neural networks that constitutes animal brains. The neural network itself is not an algorithm but rather a framework for many different Machine Learning algorithms to work together and process Complex data inputs. The main feature of the paper is to generate an approximate forecasting output and create a general idea of future values based on the previous data by generating a pattern. The scope of this project does not exceed more than a generalized suggestion tool.*

Key Words: **ANN (Artificial Neural Network), LSTM (Long Short Term Memory**), **Machine Learning, Stock Market, Stock Data**.

1. INTRODUCTION

Artificial neural network is a mathematical model. It has capability to machine learning and pattern matching. Neuron is basic unit of nervous system such as brain. ANN is borrowed from central nervous system. It is inspired by biological technology. Biological neuron stores knowledge in memory bank, while in an artificial neuron the data or information is distributed through the network and stored in the form of weighted interconnection. Neural networks among varied computing tools are more and more accustomed the monetary prognostication as neural nets are found to be technologically versatile and powerful, ideally suited to perform monetary market research. Many studies have shown that artificial neural networks have the capability to be told the underlying mechanics of stock markets. In fact, artificial neural networks are wide used for prognostication monetary markets. The use of algorithms to make trading decisions has become a prevalent practice in major stock exchanges of the world. Algorithmic trading, sometimes called high-frequency trading, is the use of automated systems to identify true signals among massive amounts of data that capture the underlying stock market dynamics. Machine Learning has therefore been central to the process of algorithmic trading because it provides powerful tools to extract patterns from the seemingly chaotic market trends. This proposed system, in particular, learns models from Bloomberg stock data and to predict stock price changes and aims to make profit over time. In this paper, we examine two separate algorithms and methodologies utilized to investigate stock Market trends and then iteratively improves the model to achieve higher profitability as well as accuracy via a prediction. The will be useful for investors to invest in stock market based on the various factors. The target is to create web application that analyses previous stock data of companies and implement these values in data mining algorithm to determine the value that particular stock will have in near future with suitable accuracy. These predict and analyzed data can be observed by individual to know the financial status of companies and their comparisons.

1.1 Material and Methods

Hardware Requirements:

1. Processor i3 and above
2. Ram 4 gb and above

Software Requirements:

1. Operating system: Windows10
2. Developing tool: Python
3. Front end: Anaconda navigator, Spyder
4. Back end: Dataset from system folder

Libraries Required:

1. Pandas
2. Matplotlib
3. Sklearn.linear_model

(**Description-** Scikit-learn (formerly scikits. learn) is a free software machine learning library for the Python programming language. It features various classification, regression and clustering algorithms including support vector machines, random forests, gradient boosting, k-means and DBSCAN, and is designed to interoperate with the Python numerical and scientific libraries NumPy and SciPy.Scikit-learn is largely written in Python, with some core algorithms written in Cython to achieve performance. Support vector machines are implemented by a Cython wrapper around

LIBSVM; logistic regression and linear support vector machines by a similar wrapper around LIBLINEAR.)

In this paper, various modules of methods are divided into following segments:

- **Stock Selection**

Stock ticker data, relating to prices, volumes, quotes are available to academic institutions through the Bloomberg terminal and Stanford has a easily accessible one in its engineering library.

- **Pre-processing**

After stock selection, Data preprocessing by done using following steps:

1. Importing libraries.
2. Importing dataset.
3. Handling missing data in dataset.

- **Metrices**

After pre-processing is done, we spilt the dataset in to trainset and test set using "minmaxscaler". Minmaxscaler goes like this:- Minmaxscaler is probably the most famous scaling algorithm and follows the following formula:-

(xi–min(x))/(max(x)–min(x))

It essentially shrinks the range such that the range is now between 0 and 1 (or -1 to 1 if there are negative values). This scaler works better for cases in which the standard scaler might not work so well. If the distribution is not Gaussian or the standard deviation is very small, the min-max scaler works better.

Existing system:-Was manual.

Proposed system:-Everything is automated once programmed combining statistics probability machine learning.

2. RESULT AND DISCUSSION

The xlxs file contains the raw data based on which we are going to publish our findings. There attributes that describe the rise and fall in stock prices. Some of these attributes are:

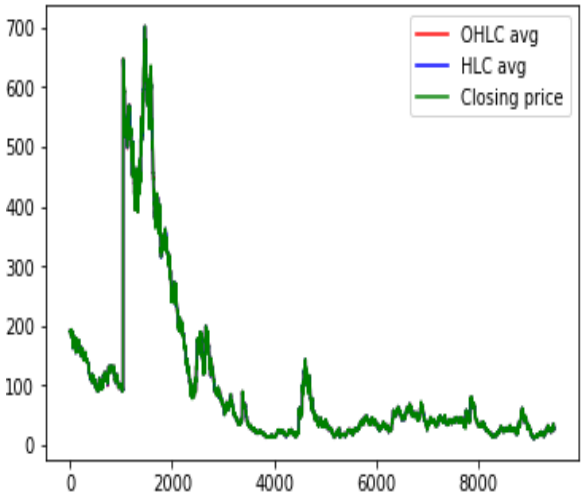
(1)HIGH, which describes the highest value the stock had in previous year.

(2)LOW, is quite the contrary to HIGH and resembles the lowest value the stock had in previous year.

(3)OPENP is the value of the stock at the very beginning of the trading day.

(4)CLOSEP stands for the price at which the stock is valued before the trading day closes. There are other attributes such as YCP, LTP, TRADE, VOLUME and VALUE, but the above mentioned four play a very crucial role in our findings.

The graph is plot over the data having batch size 512 and 90 epochs. The prediction is shown by red line and the actual trend is shown by blue. The proximity of these two lines tells, how efficient the model is. The prediction approximates real trend when a considerable amount of time has passed. The more the system is trained the greater the accuracy which will be attained.

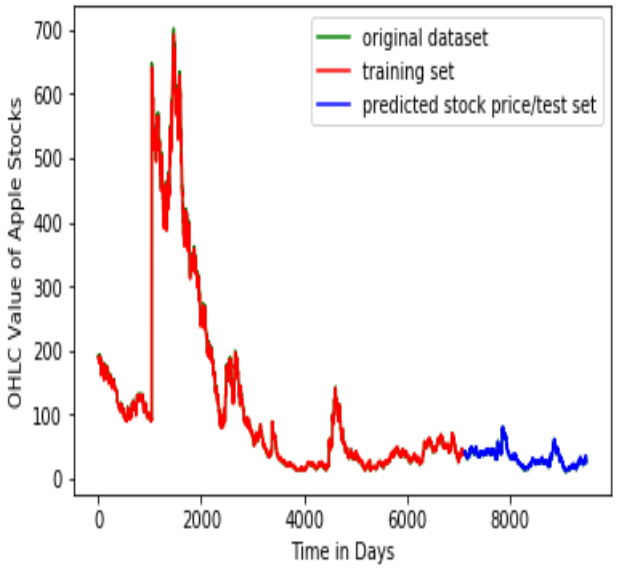


Graph -1: Plotting all indicators in one plot

```
Epoch 1/10
 - 19s - loss: 0.0024
Epoch 2/10
 - 16s - loss: 1.6491e-04
Epoch 3/10
 - 16s - loss: 1.5927e-04
Epoch 4/10
 - 16s - loss: 1.6586e-04
Epoch 5/10
 - 16s - loss: 1.6032e-04
Epoch 6/10
 - 16s - loss: 1.5725e-04
Epoch 7/10
 - 16s - loss: 1.5400e-04
Epoch 8/10
 - 17s - loss: 1.4931e-04
Epoch 9/10
 - 18s - loss: 1.4860e-04
Epoch 10/10
 - 16s - loss: 1.4624e-04
```

Fig -1: Raw Dataset

Train RMSE: 7.48
Test RMSE: 1.30



Last Day Value: 25.998659133911133
Next Day Value: 25.65450668334961

Graph -2: Predicted Result

3. CONCLUSION

Predicting stock market trends using machine learning algorithms is a challenging task due to the trends being masked by various factors such as noise and volatility. In addition, the market operates in various local-modes that change from time to time making it necessary to capture those changes in order to be profitable while trading. Our algorithms and models were simplified, we were able to meet our expectation of reaching modest profitability. By doing data pre-processing we can convert raw data into clean, understandable data and standardized data. Splitting the dataset into Training and testing sets. Scaling the features. It will help for share Holders to predict the future. We can conclude that using this proposed method and algorithm we can easily and accurately predict the future price of the market.

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