

STOCK MARKET PREDICTION USING NEURAL NETWORKS

Manas Kantimahanti¹, Bharat Thakkar², Kanishka Bisen³, Prof. Ramesh Mali

¹Manas Kantimahanti, Dept. of Electronics Communication Engineering, Pune

²Bharat Thakkar, Dept. of Electronics Communication Engineering, Pune

³Kanishka Bisen, Dept. of Electronics Communication Engineering, Pune

⁴Professor Dr. Ramesh Mali, Dept. of ECE, MIT School of Engineering, Pune, Maharashtra, India

Abstract - This paper provides an overview of a Financial Modelling technique for predicting the closing prices of Stocks. The paper describes how LSTM models are designed and implemented. The paper also shows that future stock prices can be predicted using Machine Learning and training the Neural Network with the previous years' 'stock closing price' data.

Key Words: Stock Market, LSTM, Neural Networks, Prediction.

1. INTRODUCTION

The financial market is a dynamic and composite system where people can buy and sell currencies, stocks, equities, and derivatives over virtual platforms supported by brokers. The stock market allows investors to own shares of public companies through trading either by exchange or over-the-counter markets. This market has given investors the chance of gaining money and having a prosperous life through investing small initial amounts of money, low risk compared to the risk of opening a new business or the need for a high-salary career. Stock markets are affected by many factors causing uncertainty and high volatility in the market. Although humans can take orders and submit them to the market, automated trading systems (ATS) that are operated by the implementation of computer programs can perform better and with higher momentum in submitting orders than any human. However, to evaluate and control the performance of ATSs, the implementation of risk strategies and safety measures applied based on human judgments are required. Many factors are incorporated and considered when developing an ATS, for instance, trading strategy to be adopted, complex mathematical functions that reflect the state of a specific stock, machine learning algorithms that enable the prediction of the future stock value, and specific news related to the stock being analyzed.

Time-series prediction is a common technique widely used in many real-world applications such as weather forecasting and financial market prediction. It uses continuous data over some time to predict the result in the next time unit. Many time-series prediction algorithms have shown their effectiveness in practice. The most

common algorithms now are based on Recurrent Neural Networks (RNN), as well as its special type- Long-short Term Memory (LSTM). The stock market is a typical area that presents time-series data and many researchers study it and proposed various models. In this project, the LSTM model is used to predict the stock price.

1.1 DESIGN GOALS

To make the project runs smoothly it's required that we make a plan and design some accepts like flowcharts and system architecture which are defined below.

1.2 Data Collection

Data collection is one of the important and basic objectives of our project. The right dataset must be provided to get robust results. Our data mainly consists of the previous year's or week's stock prices. We will be taking and analyzing data from Kaggle. After that seeing the accuracy we will use the data in our model.

1.3 Data Preprocessing

Humans can understand any type of data but the machine can't our model will also learn from scratch so it's better to make the data more machine-readable. Raw data is usually inconsistent or incomplete. Data preprocessing involves checking missing values, splitting the dataset and training the machine, etc.

1.4 Training Model

Similar to feeding some things, machines/models should also learn by feeding and learning on data. The data set extracted from Kaggle will be used to train the model. The training model uses a raw set of data as the undefined dataset which is collected from the previous fiscal year and from the same dataset a refine view is presented which is seen as the desired output. For the refining of the dataset, various algorithms are implemented to show the desired output.

2. System Requirements

This project can run on commodity hardware. We ran an entire project on an Intel I5 processor with 8 GB Ram, and

2 GB Nvidia Graphic Processor, It also has 2 cores which run at 1.7 GHz, and 2.1 GHz respectively first part of the is training phase which takes 10-15 mine and the second part is testing part which only takes few seconds to make predictions and calculate accuracy.

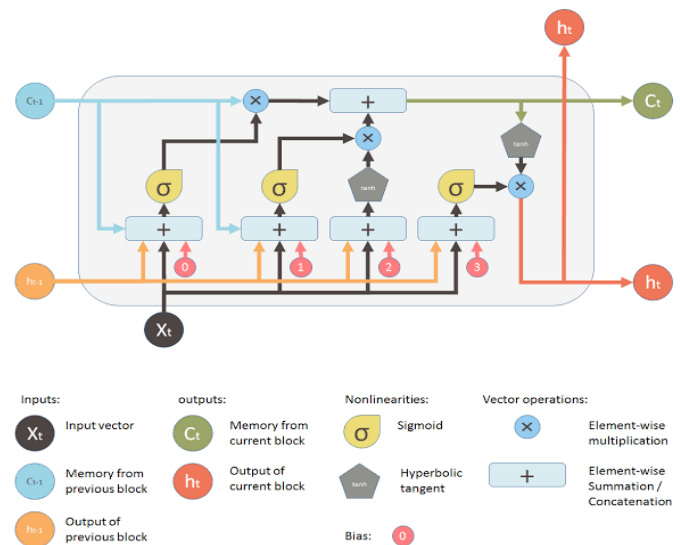
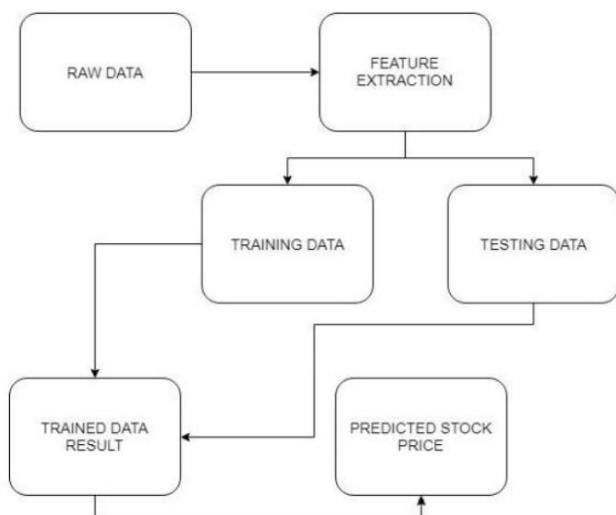
2.1 Hardware Requirements:

- RAM: 4 GB
- Storage: 500 GB
- CPU: 2 GHz or faster
- Architecture: 32-bit or 64-bit

2.2 Software requirements

- Python 3.5 in Google collab is used for data processing, model training, and prediction.
- Operating System Windows 7 and above or Linux-based or MAC OS.

System Architecture:



Working on LSTM Model

Lengthy brief-term memory is a form of recurrent neural community. In RNN output from the final step is fed as input in the present step. It tackled the problem of long-time period dependencies of RNN inside which the RNN will now not expect the phrase hold on in the long-time period reminiscencebut,can offer additional correct forecasts from the latest info. Because the gap length will increase RNN does now not offer a cost-effective performance. LSTM will with the aid of default retain the information for an extended length and it's far used for processing, predicting, and classifying based totally on time-series statistics.

Table -1: Literature Review

Sr. No.	Publications and Author	Title
1	V Kranthi Sai Reddy student, ECM, Sreenidhi Institute of technology and technology, Hyderabad, India	Stock market prediction and usage of the system
2	Dharmaraja Selvamuthu, Vineet Kumar, and Abhishek Mishra Department of Mathematics, Indian Institute of Technology Delhi	inventory market prediction using artificial neural networks on tick data
3	Mariam Moukalled Wassim El-Hajj The Mohamad Jaber Computer Science Department American University of Beirut.	computerized stock fee Prediction of the usage of device learning
4	Mohamed HAMICHE, International Workshop on Statistical Methods and Artificial Intelligence	Stock market Prediction by LSTM

3. Design, Development, and Drawings

3.1 DESIGN GOALS

To make the project runs smoothly it's required that we make plan and design

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3.1.1 Data Collection

Data collection is one of the important and basic tasks in our project. The right dataset must be provided to get robust results. Our data mainly consists of the previous year's or week's stock prices. We will be taking and analyzing data from Kaggle. Now, by seeing the accuracy, we will use the data in our model.

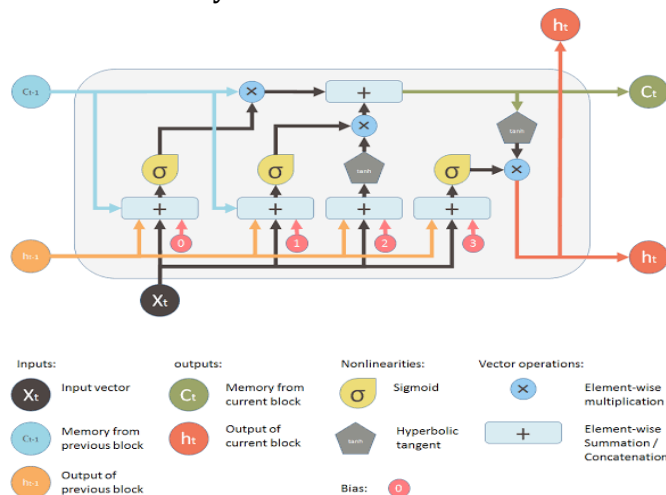
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3.2 LSTM Memory Cell



3.3 Working of LSTM Model

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4. Results

4.1 Stock Closing Prices Obtained

```
# get the stock quote
df = web.DataReader('TSM', data_source='yahoo', start='2012-01-01', end='2021-3-1')
df
```

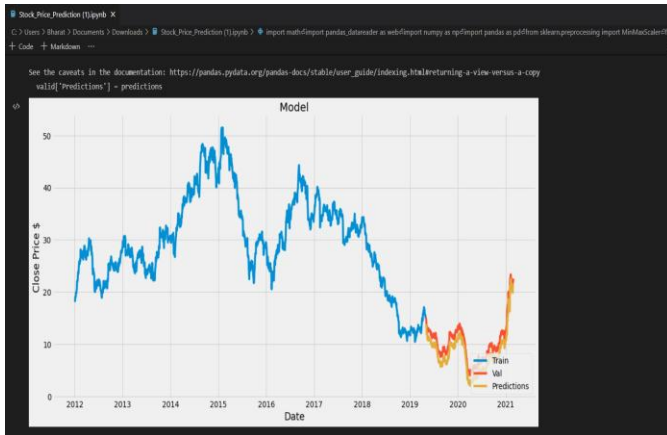
Date	High	Low	Open	Close	Volume	Adj Close
2012-01-03	18.320000	17.820000	17.820000	18.110001	1919900.0	17.598066
2012-01-04	19.000000	18.440001	18.440001	18.790001	2907600.0	18.258844
2012-01-05	19.180000	18.700001	18.790001	19.100000	1765300.0	18.560080
2012-01-06	19.180000	18.889999	19.080000	19.049999	1877900.0	18.511492
2012-01-09	19.150000	18.760000	18.820000	19.129999	1216100.0	18.589231
...
2021-02-23	22.100000	21.280001	22.059999	21.930000	2693800.0	21.930000
2021-02-24	22.160000	21.700001	21.770000	22.129999	1619200.0	22.129999
2021-02-25	22.959999	21.889999	22.740000	22.120001	2473900.0	22.120001
2021-02-26	22.290001	21.350000	21.650000	21.990000	1865500.0	21.990000
2021-03-01	22.629999	22.230000	22.459999	22.570000	1130000.0	22.570000

2304 rows x 6 columns

4.2 Stock Closing Prices Visualised



4.3 Predicted Stock Prices of TATA Motors



5. CONCLUSIONS

In this project, we are predicting the closing stock price of any given organization, we developed a web application for predicting close stock price using LSTM algorithms for prediction.

In our project, various high-level machine learning algorithms are implemented and integrated and the output is generated from the same making a user visible with the

Outputs in the form of a graph make it easier for them to see and interpret what's the scenario and they can decide on the same to invest in and get the benefit out of it.

To conclude stock is an unpredictable mechanism that follows the segments of the chain and the dependencies of the same are unpredictable. It is defined to be a curve

Which keeps on changing and turning the price from low to high and vice-versa.

6. ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of the task would be put incomplete without the mention of the people who made it possible, whose constant guidance and encouragement crown all the efforts with success.

It is my greatest pleasure to thank Prof. Dr. Virendra V. Shete (Vice-Principal, MIT SOE, and Head, Department of Electronics and Communication, MIT ADT University) for providing us heart full encouragement and support and allowing us to work in such a resourceful lab of this esteemed institute and thereby fulfilling one of my dreams. I wholeheartedly thank my project guide, Dr. Ramesh Mali, for his consistent guidance, expert

academics, and support throughout the project, without his great concepts & inspiration it would have been impossible.

I thank my parents for the emotional and financial support they provided during this project.

We show gratitude to our Honorable Principal Prof. Dr. Kishore Ravande, for having provided all the facilities and support.

I thank all faculties who directly and indirectly helped us in the completion of this project.

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