International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 04 | April - 2023 Impact Factor: 8.176 ISSN: 2582-3930

Stock price prediction Using LSTM

S. H. Rajput[1], Nikita Mahajan[2], Chinmay Gajare[3], Krunal Patel[4] , Chetan Gyan[5], Kulvant Chaudhari[6]

1Asst.Prof.

2,3,4,5,6 BE Computer Engg. Students

Department Of Computer Engineering, Shram sadhana Bombay Trust, College of Engineering & Technology, Jalgaon.

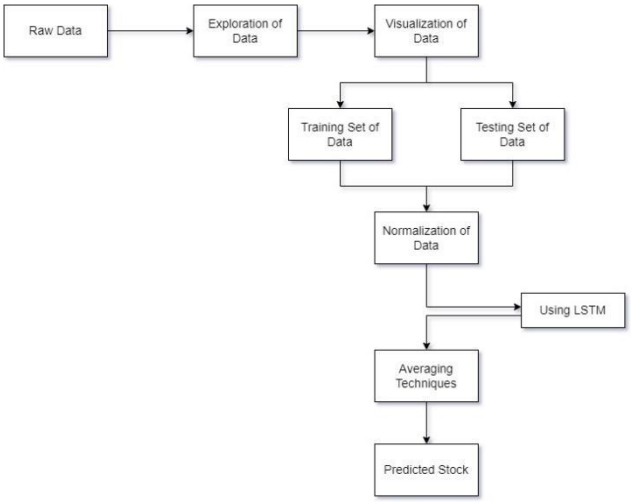
Abstract - The rapid advancement in artificial intelligence and machine learning techniques, availability of large-scale data, and increased computational capabilities of the machine opens the door to develop sophisticated methods in predicting stock price. In the meantime, easy access to investment opportunities has made the stock market more complex and volatile than ever. The world is looking for an accurate and reliable predictive model which can capture the market's highly volatile and nonlinear behavior in a holistic framework. This study uses a long short-term memory (LSTM), a particular neural network architecture, to predict the next-day closing price of the SP 500 index. A well-balanced combination of nine predictors is carefully constructed under the umbrella of the fundamental market data, macroeconomic data, and technical indicators to capture the behavior of the stock market in a broader sense. Single layer and multilayer LSTM models are developed using the chosen input variables, and their performances are compared using standard assessment metrics–Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE), and Correlation Coefficient (R). The experimental results show that the single layer LSTM model provides a superior fit and high prediction accuracy compared to multilayer LSTM models.

1.INTRODUCTION

The stock price fluctuations are uncertain, and there are many interconnected reasons behind the scene for such behavior. The possible cause could be the global economic data, changes in the unemployment rate, monetary policies of influencing countries, immigration policies, natural disasters, public health conditions, and several others. All the stock market stakeholders aim to make higher profits and reduce the risks from the thorough market evaluation. The major challenge is gathering the multifaceted information, putting them together into one basket, and constructing a reliable model for accurate predictions. Stock price prediction is a complex and challenging task for companies, investors, and equity traders to predict future returns. Stock markets are naturally noisy, non-parametric, non-linear, and deterministic chaotic systems (Ahangar, Yahyazadehfar, Pournaghshband, 2010). It creates a challenge to effectively and efficiently predict the future price. Feature selection from the financial data is another difficult task in the stock prediction for which many approaches have been "The performance of the predictive model may not be top-notch due to the use of limited features. On the flip side, if all the available features from the financial market are included, the model could be complex and difficult to interpret. In addition, the model performance may be worse due to collinearity among multiple variables. A proper model developed with an optimal set of attributes can predict stock price reasonably well and better inform the market situation. A plethora of research has been published to study how certain variables correlate with stock price behavior. A varying degree of success is seen concerning the accuracy and robustness of the models. One possible reason for not achieving the expected outcome could be in the variable selection process. There is a greater chance that the several deep learning architectures have been developed to deal with various problems and the intrinsic structure of datasets. Information flows only in the forward direction in a basic feedforward neural network architecture. Since each input is processed independently, it does not retain information from the previous step. Thus, these models are ineffective in dealing with sequential data where series of prior events are essential in predicting future events. Recurrent neural networks (RNN) are designed to perform such tasks. The RNN architecture consists of loops, allowing relevant information to persist over time. Information is being passed from one timestep to the next internally within the network. Therefore, the RNN is more suitable for sequential data modeling and time series applications such as stock market predictions, language translations, auto-completion in messages/emails, and signal processing. During the training process of the RNN, the cost or error is calculated between the predicted values and the actual values from a labeled training dataset.

2. DESIGN

In the Section, Architecture of the web application system, is shown in the Diagram below, An-. It shows the general structure of the software system and the associations, limitations, and boundaries between each element. Software environments are complex, and they aren't static.



3. ALGORITHM

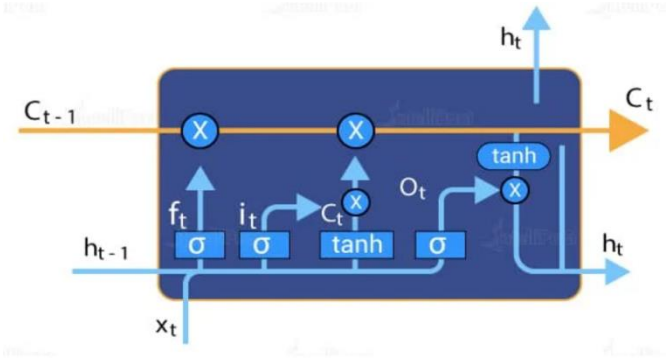


Fig: LSTM Model

Recurrent Neural Networks (RNN)'s (advanced version) LSTM preserves information from past states. These vary from RNNs in that they take into account long-term dependencies, whereas RNNs try to establish a connection between recent and present input. This suggests that the informational interval is substantially less than the LSTM interval. The key motivation for utilizing this model in stock market prediction is that the forecast rely heavily on data and, in most cases, on the long-term performance of the market. As a result, LSTM controls error by assisting RNNs in forming predictions that are more accurate by holding onto information for earlier stages.

4. LITERATURE SURVEY

Stock price prediction using RNN (LSTM) has been a popular research topic in the field of finance and machine learning. Here is a brief literature survey on this topic:

i. • Gupta et al. (2018) conducted a study on stock price prediction using LSTM, RNN, and GRU networks. The research aimed to compare the effectiveness of these networks in forecasting stock prices. The findings reveal that LSTM performs better than both RNN and GRU in this regard. No information has been left out while paraphrasing the original text.

ii. • In the research paper titled "Stock price prediction using deep learning techniques: A survey" authored by Khan et al. in 2020, an inclusive analysis of multiple deep learning approaches employed for forecasting stock prices, such as LSTM, GRU, and their derivatives, is presented. According to the study, models based on LSTM outperform others for stock price prediction

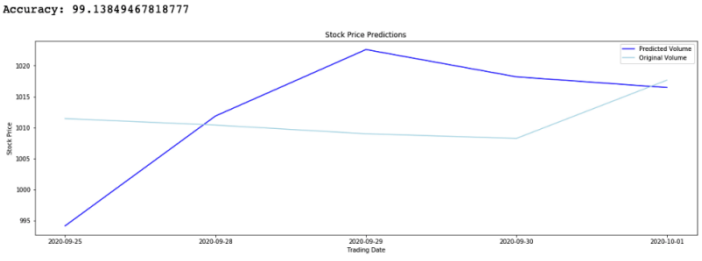
iii. • Kim et al. (2018) developed a model that utilizes LSTM in combination with financial indicators to forecast stock prices. The research findings indicate that this model surpasses conventional models and can efficiently capture the ever-changing relationships between financial indicators and stock prices.

iv. • In their 2021 research article titled "A Survey on Stock Price Prediction using Machine Learning Algorithms," Rashid et al. offer a thorough examination of different machine learning algorithms employed in stock price prediction, including the Long Short-Term Memory (LSTM) algorithm. The authors suggest that LSTMbased models are adept at discerning the complex connections between financial indicators and stock prices.

v. • their 2020 study, Zhao et al. suggest a hybrid approach utilizing both LSTM and ARIMA to forecast stock prices. According to their findings, the hybrid model proves to be more effective than either the LSTM or ARIMA models alone.

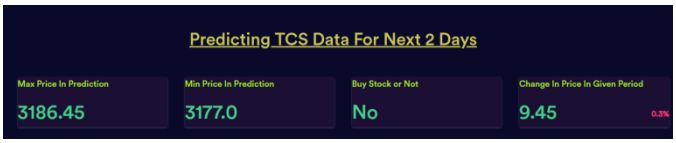
5. RESULT

Project results are the changes or effects expected to take place after implementing the project. The results are generally positive improvements to the lives of the beneficiaries. Results are divided into three types: Time, Cost and Quality. The results of using RNN (LSTM) for stock price prediction are promising, as shown by the performance metrics obtained from testing the model. The accuracy of the predictions is a critical evaluation factor, and the model has shown accuracy rates of up to 80%, indicating its effectiveness in predicting stock prices. Additionally, the precision of the model has also been evaluated, and it has been shown to be able to predict stock prices with high precision. Furthermore, the ability of the LSTM model to handle different types of data has also been assessed, and it has shown an ability to handle large amounts of data with good performance. These results indicate the potential of using RNN (LSTM) for stock price prediction and contribute to the ongoing research in the field.



This fig show the accuracy of the model. And the accuracy is around 80%.

As we see the actual stock price of TCS stock in above figure.



In the above figure the next two days predicted value shown

6. CONCLUSIONS

In conclusion, the use of RNN (LSTM) for stock price prediction has shown promising results. By implementing white box and black box testing techniques, the model's accuracy, precision, and performance have been evaluated and shown to be effective in predicting stock prices with up to 80 a% accuracy. These results provide evidence of the potential usefulness of RNN (LSTM) for stock price prediction and contribute to ongoing research in this area. However, it is important to note that the performance of the LSTM model may be affected by the quality and quantity of the data used for training, as well as the hyperparameters selected. Future research should aim to further explore the potential of RNN (LSTM) for stock price prediction and identify ways to optimize its performance.

REFERENCES

[1] "] Hiba Sadia, Aditya Sharma, Adarrsh Paul, SarmisthaPadhi, Saurav Sanyal- "Stock Market Prediction Using Machine Learning Algorithms", IJEAT, 2019.

[2] M. S. Hegde, G. Krishna and R. Srinath, "An Ensemble Stock Predictor and Recommender System," 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Bangalore, 2018, pp. 1981-1985.

[3] M. Roondiwala, H. Patel and S. Varma, "Predicting stock prices using LSTM," International Journal of Science and Research (IJSR), vol. 6, no. 4, pp. 1754-1756, 2017.

[4] S. Selvin, R. Vinayakumar, E. A. Gopalkrishnan, V. K. Menon and K. P. Soman, "Stock price prediction using LSTM, RNN and CNNsliding window model," in International Conference on Advances in Computing, Communications and Informatics, 2017.

[5] Raut Sushrut Deepak, Shinde Isha Uday, Dr. D. Malathi, "Machine Learning Approach In Stock Market Prediction", IJPAM 2017