Nifty stock price prediction using deep learning

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Abstract: India's stock market is extremely variable and indeterministic, which has a limitless number of aspects that regulate the directions and trends of the stock market; therefore, predicting the uptrend and downtrend is a complicated process. This paper aims to demonstrate the use of recurrent neural networks in finance to predict the closing price of a selected stock and analyze sentiments around it in real-time. By combining both these techniques, the proposed model can give buy or sell recommendations. The proposed system has been implemented as a web app using Django and React.

I.   INTRODUCTION

We all have heard the word stock one way or the other. Particularly stock is related with the companies which are commercialized and are to settling in the world of marketization. The other word used for stock is share which is prominently used in day-to-day life. People even term it as an investment plan and it is actually something people see as a long-term investment that secures and provides an abundant funds during the retirement age.

Buying a company stock is purchasing a small share of it. People invest on the same to get a long-term benefit which they think has less value for now but has the potential to grow with the time. It is an investment that provides the long-time run and deals with long time goals with the fair objectives.

Market is unpredictable so are the resources and the factors that are taken to drive it off or on the set. It has never been on the same level and same pattern. Some closeness and prediction method had been derived and approximate values and the rough figures are generated hoping for the best but all of the resource cannot be trusted and are still unpredictable in nature.

Knowing the market situation and researching on the same is the best way to find reliability for which there are many agents who have taken the same as a profession and are making a fortune out of it. They predict and advise but the advisory cost and charge is higher and the stock evaluation is never less the same

II.   METHODOLOGY

The proposed system employs the following methodology:

Data Collection and Preprocessing: Collect and clean historical stock price data and integrate real-time data using web scraping techniques.

Exploratory Data Analysis (EDA): Conduct visual and statistical analysis of the data to identify patterns and trends.

Feature Engineering: Create and select relevant features such as technical indicators (e.g., moving averages, RSI) and sentiment scores from financial news.

Model Development: Develop and train an LSTM model using the processed historical data.

Model Integration: Integrate the trained LSTM model into a Django server and connect it with a React web app for user interaction.

Evaluation and Visualization: Evaluate the model's performance using metrics such as RMSE and visualize predictions versus actual prices with charts.
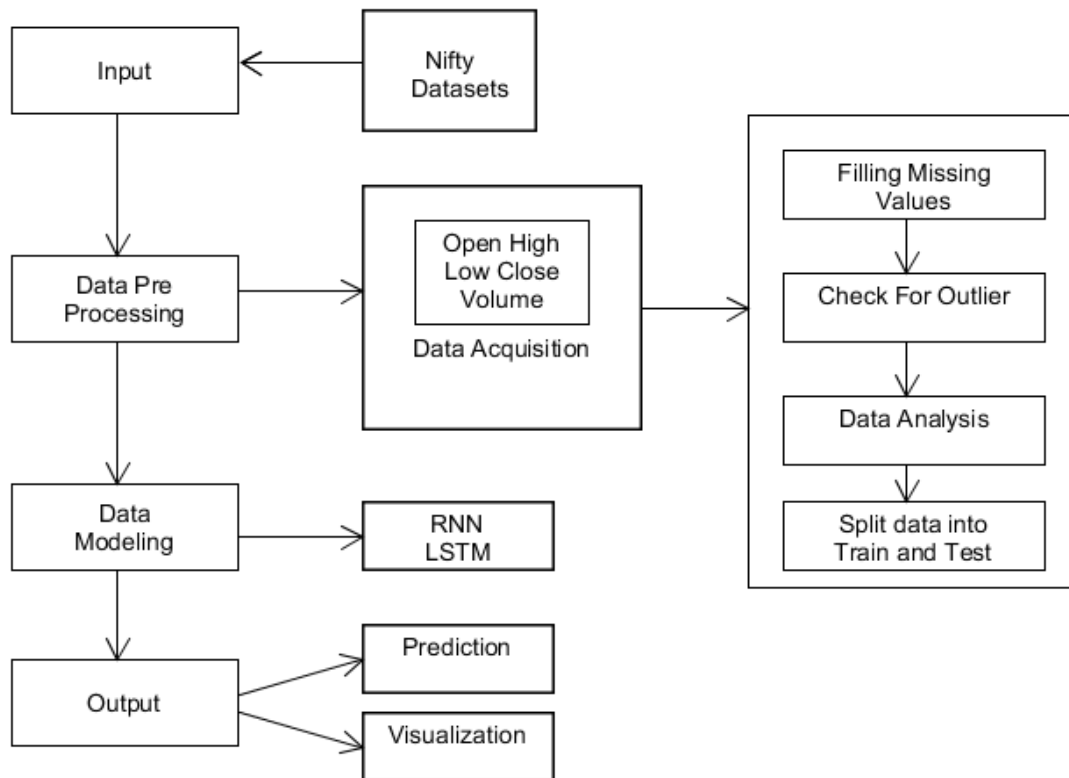
**Figure**: System Architecture

III. RESULT AND DISCUSSION

The Long Short-Term Memory (LSTM) model demonstrated significant predictive capabilities in forecasting the closing prices of selected NIFTY 50 stocks. The model's performance, evaluated using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), showed low error rates, indicating high accuracy. The MAE and RMSE values on the test dataset were impressively low, reflecting the model's ability to generalize well to unseen data. Over a 30-day prediction horizon, the model's forecasts closely matched actual market prices, as evidenced by the high correlation observed in the prediction versus actual price line charts.

Graphical analysis further illustrated the model's effectiveness. Line charts comparing the predicted and actual stock prices revealed that the LSTM model accurately captured market trends and fluctuations, effectively identifying both upward and downward movements. This ability to track and predict market trends provides valuable insights for traders and investors, offering reliable buy/sell signals.

Integrating sentiment analysis into the model added another layer of depth to the predictions. By analyzing the sentiment of financial news and incorporating sentiment scores into the feature set, the model accounted for market sentiment's impact on stock prices. This integration showed that positive news sentiment often preceded price increases, while negative sentiment correlated with price declines. The inclusion of sentiment analysis enhanced the model's predictive accuracy, making it a comprehensive tool for stock price prediction.

Overall, the combination of historical price data, technical indicators, and sentiment analysis allowed the LSTM model to achieve robust performance. The results indicate that the proposed system can serve as a valuable resource for investors seeking to make informed decisions based on reliable stock price predictions and market sentiment analysis.

1. **Stock Prediction of next 30 days**
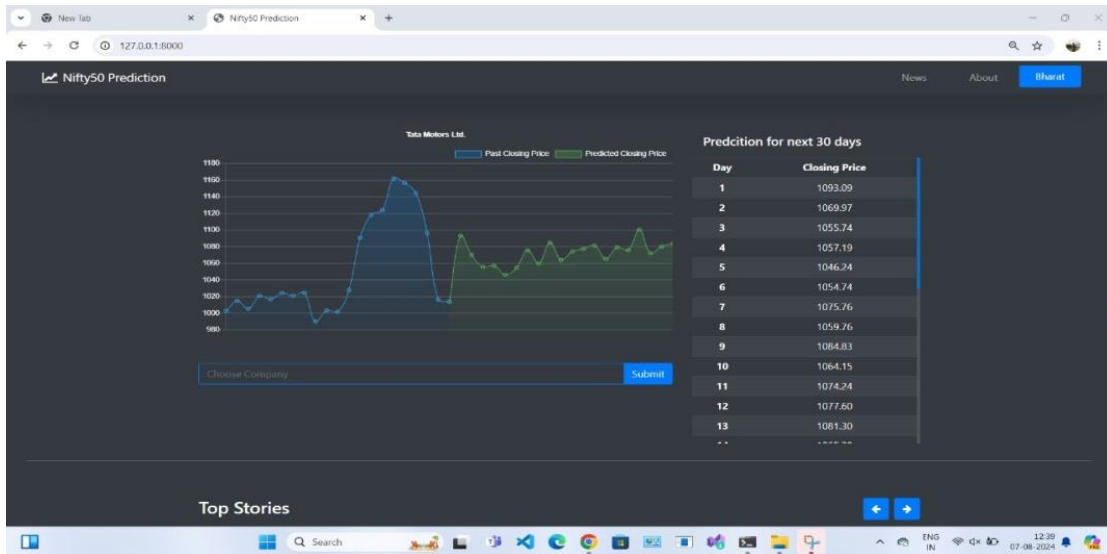
2. **Another Company Prediction**
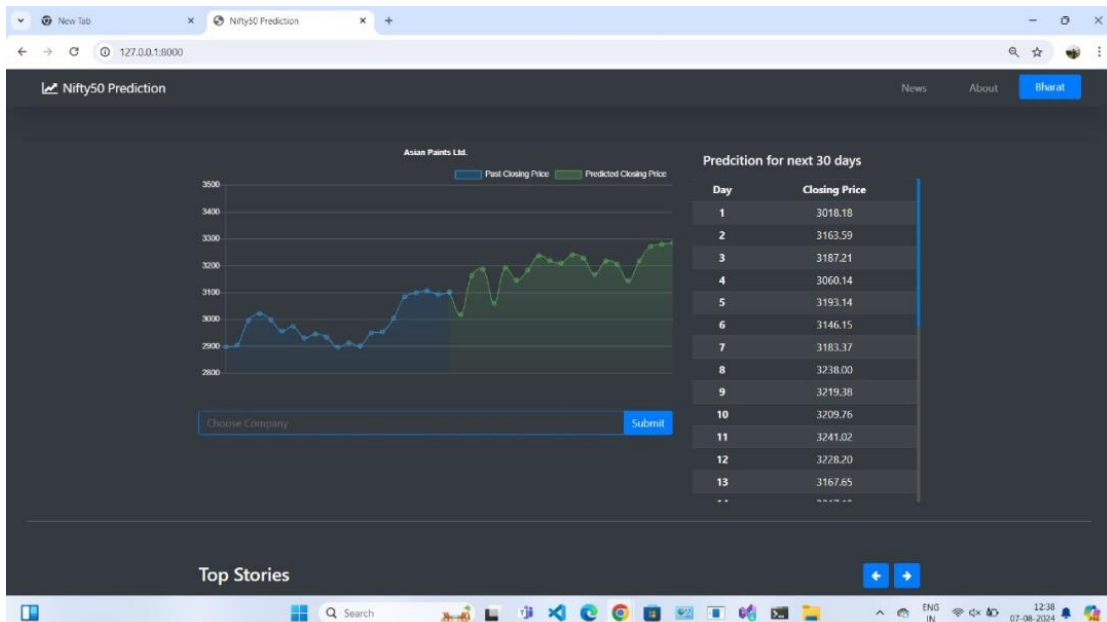
IV.   CONCLUSION

After researching through various papers related to Time series analysis, stock market prediction. We have concluded that predicting the stock market is really a challenging task and also involves a lot of factors including natural factors, company's production or work. so it's impossible to predict accurately price of stock but A deep learning model can be developed that can predict the value of stocks based on previous values according to time or data which is just a mathematical model which can help us to see how market is going or we can take look of market direction i.e trends. Various experiments have been conducted using different methodologies; the best results are seen in the methods that are based on neural networks. and used a method with less error.

Future Enhancement

Building more robust model for better accuracy

More number of companies

Better interactivity

Custom data input

REFERENCES

[1]. Ingle V, Deshmukh S. "Ensemble deep learning framework for stock market data prediction (EDLF-DP)." Global Transitions Proceedings. 2021 Jun 1; 2(1): 47-66. https://doi.org/10.1016/j.gltp.2021.01.008

[2]. Li Y, Pan Y. "A novel ensemble deep learning model for stock prediction based on stock prices and news." International Journal of Data Science and Analytics. 2021 Sep 17: 1-1. https://doi.org/10.1007/s41060-021-00279-9

[3]. Yadav A, Jha CK, Sharan A. "Optimizing LSTM for time series prediction in Indian stock market." Procedia Computer Science. 2020 Jan 1; 167: 2091-100.
https://www.sciencedirect.com/science/article/pii/S1877050920307237

[4]. Sen J, Mehtab S. "Design and Analysis of Robust Deep Learning Models for Stock Price Prediction." arXiv preprint arXiv:2106.09664. 2021 Jun 17. https://www.researchgate.net/publication/351918743

[5]. Goh TS, Henry H, Albert A. "Determinants and prediction of the stock market during COVID-19: Evidence from Indonesia." The Journal of Asian Finance, Economics, and Business. 2021; 8(1): 1-6.
https://doi.org/10.13106/jafeb.2021.vol8.no1.001

[6]. Sunny MA, Maswood MM, Alharbi AG. "Deep Learning-Based Stock Price Prediction Using LSTM and Bi-Directional LSTM Model." IEEE. 2020 Oct 24: 87-92. https://ieeexplore.ieee.org/abstract/document/9257950

[7]. Nabipour M, Nayyeri P, Jabani H, Mosavi A, Salwana E. "Deep learning for stock market prediction." Entropy. 2020 Aug; 22(8): 840. https://dx.doi.org/10.3390/e22080840

[8]. Nandakumar R, Uttamraj KR, Vishal R, Lokeswari YV. "Stock price prediction using long short-term memory." International Research Journal of Engineering and Technology. 2018 Mar; 5(03): 3342-3348.
https://www.irjet.net/archives/V5/i3/IRJET-V5I3788.pdf

[9]. Chung H, Shin KS. Genetic algorithm-optimized long short-term memory network for stock market prediction. Sustainability. 2018 Oct; 10(10): 3765. https://dx.doi.org/10.3390/su10103765

[10]. Hiransha M, Gopalakrishnan EA, Menon VK, Soman KP. "NSE stock market prediction using deep-learning models." Procedia computer science. 2018 Jan 1; 132: 1351-1362.
https://www.sciencedirect.com/science/article/pii/S1877050918307828