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Nifty 50 Stock Prediction Using Deep Learning

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ABSTRACT: Prediction in the stock market is complicated and volatile. The major goal of this topic's persuasionis to anticipate the stability of future market stocks. Several researchers have conducted studies on the future market evolution movement. Stock is made up of changing data, which makes data an essential source of efficiency. Deep learning has just entered the scene for the deployment and prediction of training sets and data models in the latest trend of Stock Market Prediction. Deep Learning uses various predictive models and algorithms to forecast and automate tasks. To forecast stock prices, we employ LSTM and elastic net machine learning algorithms to predict future stock prices.

KEYWORDS: LSTM, Elastic Net, RNN, CNN, Prediction, Train, Test, Deep Learning, Accuracy, Data pre-processing, Prediction.

I. INTRODUCTION

One of the most difficult tasks is predicting how the stock market will perform. There are numerous factors involved in physical vs psychological factors, irrational vs rational behavior, including prediction of the market and so on. All of the above-mentioned factors merge to make stock prices volatile and too difficult to predict with high accuracy. The current working model uses a deep-learning regression model based on the LSTM architecture for accurately predicting future stock prices. Using the results predicted by the model, the buy or sell decisions are made and the profit resulting from such buy/sell transactions is accumulated for several stocks selected from the main seven critical sectors listed in the NSE, India. A metric used to measure the profitability of a stock is the gross profit ratio earned during a specified period divided by the average price of the stock over the same period. This calculation helps to evaluate the profitability of the stock.

Here in this project, we will work with historical data of stock prices of a publicly listed company. We will implementa number of machine learning algorithms to predict the future stock price of this company, starting with simple algorithms like averaging and linear regression, and then moving on to advanced techniques like elastic net and LSTM.

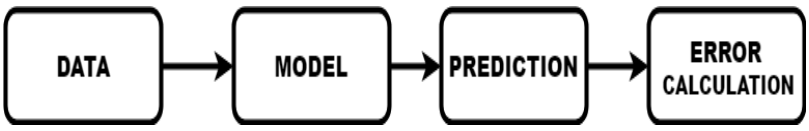

Fig 1.1 Working Model

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II. RELATED WORKS

1) **Ingle V et al. [1]:** developed a Deep Learning framework that predicted the stock market. Gradient Boosted Models (GBM), Generalized Linear Models (GLM), and other deep learning algorithms are some of the models developed by the deep learning framework. GBM is a technique for increasing the strength of a gradient. The internet news feed comes from a variety of websites, including Yahoo finance and Google finance.
2) **Li Y et al. [2]:** had fostered a novel ensemble deep learning model for stock expectation relying on the current stock price and related insight about the organization. The authors utilize sentiment analysis to remove applicable data from an assortment of text-based information sources using a blending ensemble deep learning model which helps in anticipating future market practices. The primary level is comprised of two repetitive neural networks, one Long Short-Term Memory (LSTM), and one Gated Recurrent Unit (GRU), which is trailed by a completely associated neural network as the subsequent level model.
3) **Yadav A et al. [3]:** have used the LSTM model for stock value forecasting. Indian Stock Market was chosen as a dataset and LSTM model for predicting stock prices. Different companies from various organizations were picked as a dataset. According to probability values, the distinctions among stateless and stateful LSTM for stock value prediction are analytically negligible.
4) **Sen J et al. [4]:** have created a collection of predictive regression models based on deep learning algorithms for the accurate and reliable forecasting of future stock values on India's diverse industries' National Stock Exchange (NSE). Four Convolutional Neural Network (CNN) regression models were used in the prediction framework, and six regression models based on the LSTM model were used. The results of the many models proposed in this survey were summarized by the authors. They rated the models based on each statistic after evaluating them on two metrics: the accuracy metric and the speed metric were used to evaluate the model.
5) **Goh TS et al. [5]:** have studied and inspected the securities exchange file determinants and the forecast utilizing the Fast Fourier Transform (FFT) bend fitting of the Jakarta Stock Exchange (JKSE) Composite Index during the COVID-19 pandemic. Spellbinding measurements, multicollinearity tests, theory tests, assurance tests, and forecasts using FFT bend fitting are completely shrouded in this examination. The discoveries uncover four new and solid bits of proof.
6) **Sunny MA et al. [6]:** proposed a new stock prediction model using the LSTM model and the Bidirectional Long Short-Term Memory (BI-LSTM) model. The dataset was collected from Yahoo Finance. They used Google stocks from 2004 to 2019.
7) **Nabipour M et al. [7]:** proposed a model for predicting the stock market. Among all other known deep learning models, LSTM has high accuracy and error is minimum. The LSTM connects previous data to the current neuron. The dataset was taken from the Tehran stock exchange, and among the data four groups were taken. They are petroleum, basic metals, non-metallic minerals, and diversified financials. The past 10 years of data were chosen for the experiment. Diversified financials for different numbers of days were chosen for the experiment. RMSE, MSE, Mean Absolute Percentage Error (MAPE), and Mean Absolute Error (MAE) were used for error detection. This model predicted the stocks with 60% accuracy.
8) **Nandakumar R et al. [8]:** have proposed a new type of stock forecast system. They proposed an internet learning calculation that uses a sort of RNN called LSTM. Yahoo finance and Google finance were utilized to assemble the securities exchange measurements. LSTM network is comprised of one info layer with five neurons and a few secret layers (n), each with a few LSTM memory cells (m), and one result layer.
9) **Chung H et al. [9]:** have built a modern stock market forecasting model using publicly available financial information. They used deep learning due to its greater capacity to learn from huge datasets and proposeda hybrid strategy that combines an LSTM network with the Genetic Algorithm (GA). For this study, data was gathered from Korea Stock Price Index (KOSPI) which spans over the period from January 2000 to December 2016. The complete dataset is divided into two parts: the training set (80%) and the holdout set (20%).
10) **Hiransha M et al. [10]:** have utilized four kinds of significant learning models to anticipate an organization's stock price considering past prices: Multilayer Perceptron (MLP), RNN, LSTM, and CNN.

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Data required was gathered from the NSE's automobile, banking, and information technology sectors. They derived the day-by-day closing price of each stock from these datasets. The training dataset covers the period from January 1996 to June 2015 and includes 4861 days of closing prices.

III. METHODOLOGY

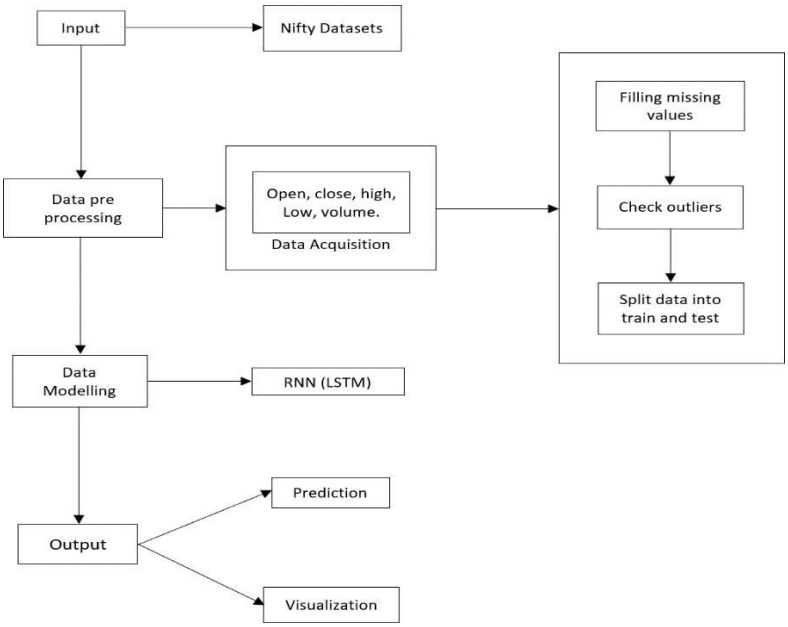

Fig 3.1 Data Flowchart

1) Collecting Data: The data is collected from previous Nifty records in Yahoo.finance datasets.
2) Data pre-processing:
   - Identifying missing Values.
   - Check for outliers.
   - Split data into train and Test.
3) After the pre-processing, the split train data are passed as input to the LSTM algorithms for training the data.
4) After training, the test data is validated for accuracy purposes.
5) The Prediction for the next 30 days is calculated.
6) The analysis help in the prediction of the price.

IV. MERITS AND DEMERITS

Merits

1) ***Risk management***: Accurate stock predictions can help investors manage their risks more effectively. By knowing which stocks are likely to perform well or poorly, investors can adjust their portfolios accordingly and avoid potential losses.

2) ***Increased returns***: Accurate stock predictions can also lead to increased returns. By investing in stocks

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that are likely to perform well, investors can benefit from capital gains and higher dividend payouts.

3) ***Improved market efficiency***: Accurate stock predictions can contribute to improved market efficiency by providing valuable information to investors and traders. This can help reduce information asymmetryand lead to more accurate stock prices.

4) ***Better investment decisions***: If you can accurately predict the direction of the Nifty 50 index, you make better investment decisions by buying or selling stocks accordingly.

Demerits

1) ***Data accuracy***: Stock prediction models rely heavily on historical data and market trends, but this data is not always accurate or reliable. Inaccurate data can lead to faulty predictions and poor investment decisions.

2) ***High volatility***: Nifty 50 stocks can be highly volatile, especially during periods of market turbulence. This can make it difficult to accurately predict the direction of the market and lead to higher levels of risk.

3) ***Limited scope***: The Nifty 50 index only tracks the performance of 50 large-cap companies, which may not represent the broader stock market or the overall economy.

4) ***Overreliance on models***: Some investors may become too reliant on stock prediction models and fail to consider other important factors, such as company fundamentals and management quality.

V. SIMULATIONS RESULTS

The input data is visualized by combining line plots for the nifty 50 companies. In this paper, we have checked the accuracy of elastic net regression and the LSTM algorithm. Elastic net shows very poor accuracy where the graph is not overlapping, but LSTM shows better accuracy for 50 stocks data.

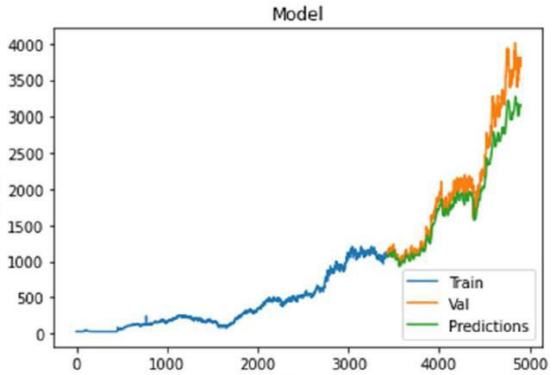

Fig 5.1 Prediction of TCS Stocks

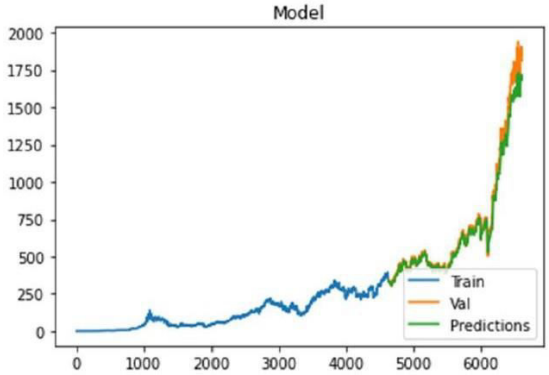

Fig 5.2 Prediction of Infosys Stocks

VI. CONCLUSION

In this paper, we analyze the growth of the companies from different sectors and try to find out which is the best time span for predicting the future price of the share. So, this shows us an important conclusion that companies from a particular sector have the same dependencies and the same growth rate. The prediction can be more accurateif the model will train with a greater number of datasets. Moreover, in the case of the prediction of various shares, there may be some scope for specific business analysis. We can study the difference in the pattern of the share

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price of different sectors and companies and can analyze a graph with a different time span to fine-tune the accuracy. This framework extensively helps in market analysis and prediction of the growth of different companiesin different time spans. Incorporating other parameters such as investor sentiment, election outcome, and geopolitical stability which are not directly correlated with the closing price may improve the prediction accuracy of the stock.

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