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Stock Market Prediction using Deep Learning

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ABSTRACT: Investing in a group of assets has never been straightforward; the abnormality of the financial market does not enable simple models to anticipate future asset values with more precision. Machine learning, which involves teaching computers to execute activities that would ordinarily need human intelligence, is the leading topic in scientific research right now. This article seeks to create a model utilising Deep Learning, specifically the Long-Short Term Memory model (LSTM), to forecast future stock market values. The primary goal of this research is to determine the precision with which a machine learning system can predict. Stock market price prediction is a difficult undertaking that has typically required substantial human-computer cooperation. When compared to existing stock price prediction systems, this will produce more accurate results. The network is trained and tested for accuracy with data of varying sizes, and the results are summarised. The purpose of this study is to forecast stock market prices in order to make more informed and precise investment decisions.

KEYWORDS: Data Analysis, Stock Prediction, Deep Learning, Stock Market.

I. INTRODUCTION

Stock (also known as equity) is a financial instrument that reflects ownership of a portion of a firm. This allows the stockholder to a share of the corporation's assets and profits in proportion to the amount of stock they own. Stock units are referred to as "shares." A stock is a broad phrase that refers to any company's ownership certificates. Market forces cause stock prices to fluctuate on a daily basis. This means that share prices fluctuate due to supply and demand. When more individuals desire to purchase a stock than sell it (demand), the price rises. If more people wanted to sell a stock than acquire it, there would be more supply than demand, causing the price to fall. It is simple to understand supply and demand. What is tough to understand is what makes individuals like one stock and dislike another. It all boils down to determining what news is good for a company and what news is bad for it. There are numerous solutions to this problem, and almost every investor has their own thoughts and techniques. Having said that, the main premise is that a stock's price movement represents what investors believe a company is worth. Don't confuse a company's worth with its stock price. A company's worth is determined by its market capitalization, which is the stock price multiplied by the number of shares outstanding. A firm that trades at $100 per share and has 1,000,000 shares outstanding, for example, has a lower value than one that trades at $50 and has 5,000,000 shares outstanding ($100 x 1,000,000 = $100,000,000, while $50 x 5,000,000 = $250,000,000). To make matters even more complicated, a stock's price reflects not only a company's current value, but also the future growth that investors anticipate.

II. RELATED WORK

DarmadiKomo et al. The radial basis function (RBF) and multilayer percept (MLP) were employed in algorithmic models to provide and price predictions, which were individually trained on different sets of data. Actual data from the Wall Street Journal (Dow Jones Industrial Average) was used as a reference in these experiments. The suggested Dow Jones index by the models achieved a significant level of accuracy, providing index funds that tracked more than 80% of the average monthly return. In actuality, the data demonstrate that the RBF network outperforms the MLP network significantly.

D. VenugopalSetty et al. An in-depth investigation of the efficiency of various data mining methodologies for business results was conducted. This is offered for further information on the fundamentals of the Indian stock market, such as how significant data mining is in the field of prediction, as well as other relevant data mining techniques, which are explained in the article. In other words, the gap between stronger storage and more efficient retrieval technologies is growing. There is a completely new sequence of discovery that should be implemented in order to improve end-user information layout and resolution.

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Dase R.K. et al. He broadened his knowledge by doing a literature review on the application of neural networks to stock prediction. They discovered that time series analysis could not accurately predict indexes, but it appears that an artificial neural network may be suitable for this purpose. Neural networks can extract an astonishing amount of knowledge from massive amounts of data. Based on past research, they conclude that a market Artificial Network model is useful in forecasting the world's financial markets. They suggested, with evidence, that this is a unique field of application for Artificial Neural Networks, with high expectations for their use in accurate stock market index analysis.

Akhter Mohiudd et al., In his study, he forecasted stock price changes using a neural network-based approach. To estimate potential stock returns, a neural network was used. Several ways have been used to examine the indicator's ability to produce false findings. Real data from the National Stock Exchange of India (NSE) was used in controlled studies to test the correctness of this technique. TCS, Wipro, Axis Bank, Maruth, and Tata Steel were among the companies that began operations on January 2, 2007 and ended on March 3, 2010. In his perspective, neural PERSISTEMBLE did not fulfil the standard, but he also created novel neural system design and training methodologies to reduce inaccuracy in prospective forecasts.

D. Ashok kumar et al. General time series concepts were discussed, as well as the necessity for market indexes and the implications of applying an ANN to time series. A review of past work was also undertaken to investigate models employing neural networks for time series forecasting. NIFICS ranks in the middle of the stock market index (MIDCAP) and the neural network market model (BSE). The findings indicate that the score is slightly above average. According to their findings, the best performance is attained with an ideal weighting factor of 0.28, a momentum of 0.5, and a best epoch of 2960. In the industry, the model achieved a lower-than-expected fit and could be used to any type of stock outcomes.

AdityaNawani et al. A comparison of data mining techniques and market forecasting methods can be investigated for use in constructing market capitalization models for trading firms. Their thesis looks on how neural networks are used in conjunction with the Graphical User Interface for the MATLAB Graphical Digital Toolbox to produce reliable results. When the qualified technique is utilised, forecasts regarding the parameters involved in supply and demand in a certain sector can be made.

III. OPEN ISSUES

In many economies, stock trading is big business. Stockbrokers do not appear to have any sophisticated technology that can help them advise clients on which stocks are suited for any purchase or sell trade, based on the information on their websites. These websites offer information pointing to the application of fundamental, technical, and time series analytic approaches. These popular strategies display a trend in future movement rather than the expected transaction price for any asset in the future. It is thus 7 desired to have a tool that not only reveals the direction of price movement, but also the most likely price value of the stock itself.

IV. PROPOSED SYSTEM

In the proposed approach, we want to precisely determine the next day's closing value so that investors can purchase or sell shares with certainty. Long Short Term Memory (LSTM) is a deep learning artificial neural network. The LSTM is a sophisticated neural network with a memory cell that temporarily stores a chunk of data for future use. To efficiently predict stock prices, we propose using the LSTM (Long Short Term Memory) algorithm.

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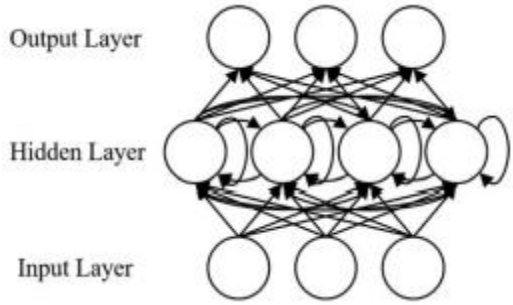
Algorithm:



As shown in Fig. , for a RNN, let our input x be a sequence whose length is T, x = {x1 , x2 ,...,xT }, and each item xt is a feature vector. At time step t, given the previous hidden layer state ht−1 , the current hidden layer state ht and the output layer state yt can be calculated by,

$$h_t = \sigma_h(w_h x_t + U_h h_{t-1} + b_h)$$
$$y_t = \sigma_y(w_y h_t + b_y)$$

where Wh and Wy denote the input-to-hidden and hidden-to-output weight matrices, respectively, Uh is the matrix of the recurrent weights between the hidden layer and itself at two adjacent time steps, bh and by are the biases, and σh and σy denote the activation functions.
At each time step, the input is propagated in a standard feedforward fashion, and then, a learning rule is applied. The back connections lead to the result that the context units always maintain a copy of the previous values of the hidden units (sincethey propagate over the connections before the learning rule is applied). Thus, the network can maintain a state, allowing it to perform such tasks as sequence prediction that are beyond the power of standard multilayer perception.

Formula for calculating current state:

$$h_t = \int (h_{t-1}, x_t)$$

Where,
h_t-> Current state
h_{t-1} -> Previous state
x_t-> Input state

Formula for applying Activation function:

$$h_t = \text{activation}(W_{hh} h_{t-1} + w_{xh} x_t)$$

Where,
W_{hh}->Weight at recurrent neuron
w_{xh}->Weight at input neuron

Formula for calculating output:

$$y_t = w_{hy} h_t$$

y_t->Output
w_{hy}->Weight at output layer

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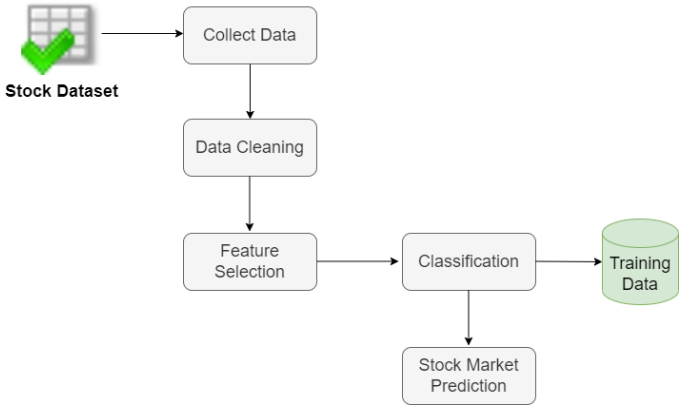
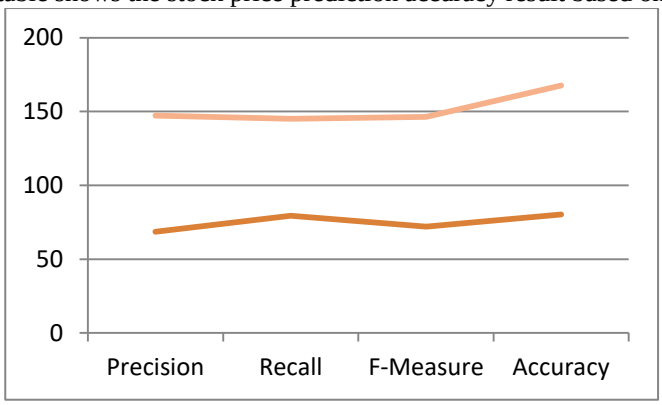


Figure 1. System Architecture

V. RESULTS AND DISSCUSSION

We compared the proposed stock price prediction accuracy on number of samples and show the result graphically. Let see the following graph and table shows the stock price prediction accuracy result based on classification technique.



	Existing System	Proposed System
Precision	68.45	77.70
Recall	79.44	65.64
F-Measure	72.11	74.31
Accuracy	80.29	88.26

VI.CONCLUSION

Investors are quite popular with stock price predicting because investors want to know their return on investment. Historically, technical analysts and traders employed stock market forecasts based on prior rates, amounts, price dynamics, and fundamental patterns. Stock price forecasts are presently quite high. Not only the financial situation, but also the complicated when equity markets are touched by nation economics, political environment, and natural disasters, among other factors. Returning to the financial exchange Standard procedures cannot be predicted precisely in nature. Investors are quite popular with stock price predicting because investors want to know their return on investment. Analysts and traders have traditionally employed stock market projections based on previous rates, amounts, price dynamics, and fundamental tendencies.

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