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STOCK PRICE PREDICTION USING MACHINE LEARNING

Amrata Shet, Ashika.S, Dhanya Hanumanth Naik, Sameeksha Shetty
Department of Information science And Engineering
Canara Engineering college
Mangalore, Karnataka

Mr. Ranganatha. k
Assistant professor
Department of Information science And Engineering
Canara Engineering college
Mangalore, Karnataka

***Abstract*— predicting stock market is one of the challenging tasks in the field of computation. Physical vs. physiological elements, rational vs. illogical conduct, investor emotions, market rumors, and other factors all play a role in the prediction. All of these factors combine to make stock values very fluctuating and difficult to forecast accurately. We look towards data analysis as a potential game-changer in this field. When all information about a company and stock market events is promptly available to all stakeholders/market participants, according to efficient market theory, the impacts of those occurrences are already incorporated in the stock price. As a result, it is stated that only the historical spot price accurately represents all other market events and may be used to predict future movements. As a consequence, we infer future trends using Machine Learning (ML) techniques on historical stock price data, using the previous stock price as the final representation of all influencing factors. Machine learning techniques can reveal previously undiscovered patterns and insights, which can subsequently be used to make accurate predictions. Using the LSTM (Long Short-Term Memory) model and the company's net growth calculation approach, we create a system for assessing and projecting a company's future development.**

***Keywords*— Stock price prediction, LMS (Least mean square) algorithm, LSTM Algorithm, RNN (Recurrent neural network) architecture, Data Cleaning, Normalization, Feature Extraction.**

I. INTRODUCTION

Correct stock predictions can result in significant profits for both the seller and the broker. Obtaining an exact value is difficult since it is directly dependent on external factors such as the economic, social, psychological, and political areas, all of which have a substantial impact. Researchers from several domains, including business and computer science, are studying stock price prediction. In the research field, estimating stock prices is both fascinating and challenging. If investors do not have enough information and knowledge, their investment can suffer a much loss. Stock market forecasting involves predicting a company's present trends as well as the value of its stocks, whether they are rising or falling. The stock market is a marketplace where investors may buy and sell firm stock.

We are developing a model that efficiently anticipates stock prices based on current market patterns by employing a machine-learning algorithm to estimate stock prices. Stock price predictions are employed using a variety of methods. The RNN model is employed when the model needs to handle time-series data or natural language. Among the RNN architecture, LSTM is one of the most successful algorithms. It is more efficient in dealing with long input sequences than other recurrent neural networks. Thus, with the help of the LSTM network, a very high level of accuracy may be attained in forecasting future trends and stock price forecasts. The LMS filter is a type of adaptive filter used for linear problem-solving. We'll use LMS to show how linear algorithms are employed to anticipate stock market movements with great accuracy.

II. PROPOSED ALGORITHM

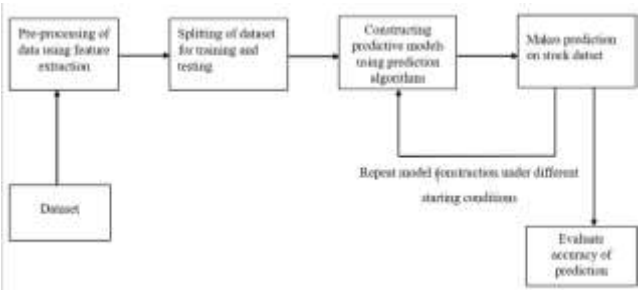

Fig i. Architectural Design

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Raw Stock Price Dataset: Our project aims to predict future values by comparing them to the previous values. Day-wise past stock prices of selected companies are collected from the Kaggle official website. It collects different sectors of stock data, including Banking, Pharma, Petroleum, Software and Textiles, and it includes the opening price, the highest price, the lowest price, the closing price, the adjusted closing price, and the volume of stock.

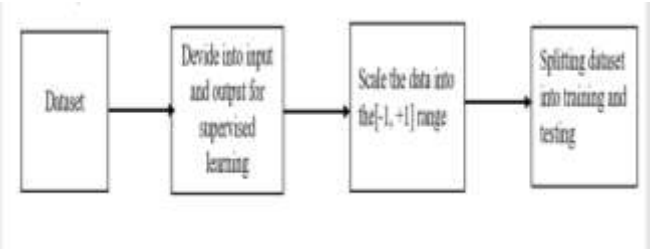
Pre-processing: The following steps are included in this project:

a) Data discretization: This is a type of data reduction that is especially important for numerical data.

b) data transformation: Normalization

c) Data cleaning: by filling missing values.

d) Data integration: The process of combining data files. After the dataset has been cleaned up, it is separated into training and testing sets for evaluation. Making a data structure with 60 timesteps and just one output.



Prediction using LSTM: The LSTM algorithm is used to forecast stock prices in this system. The training data is first sent into the system, which then trains the model. The projected values are then compared to the actual values in the testing phase.

Evaluation: For comparison, we calculate the Accuracy, Mean Square Error (MSE), and Root Mean Square Error (RMSE) values throughout the assessment process.

Model Building:

Long short-term memory network: Building a model for a long-term memory network: The LSTM (long short-term memory network) is a recurrent neural network that is used to learn new things (RNN).

The following is how the LSTM works:

The LSTM is a one-of-a-kind network structure with three "gate" components. There are three gates in an LSTM unit: input gate, forgetting gate, and output gate. As data enters the LSTM network, rules may be applied to it. Only data that adheres to the algorithm will be preserved, while data that does not will be destroyed using the forgetting gate. The experimental data in this research are real historical data acquired from the Internet. Three data sets were used in the studies. It's essential to build an optimization method that consumes fewer resources and converges faster.

- An automated encoder and an integrated layer were employed in the Long Short-Term Memory (LSTM) neural network.
- In place of RNN, LSTM is used to avoid bursting and vanishing gradients.
- This project uses Python to train the model and MATLAB to reduce the input dimensions. MySQL is a database that allows you to save and retrieve data in the form of a dataset.
- The historical stock data table includes information such as the starting price, maximum price, lowest price, closing price, transaction date, volume, and more.
- The accuracy of the LSTM model used in this research is 57%.

Below is the code to implement a LSTM.

LSTM

- Inputs: dataset
- Outputs: RMSE of the forecasted data

Split dataset into 75% training and 25% testing data

- size = length(dataset) * 0.75
- train = dataset [0 to size]
- test = dataset [size to length(dataset)]

Procedure to fit the LSTM model

- Procedure LSTM Algorithm (train, test, train, size, epochs)
- X = train
- y = test
- model = Sequential ()
- model.add(LSTM(50), stateful=True)
- model.compile(optimizer='adam', loss='mse')
- model.fit(X,y,epochs=epochs, validation_split=0.2)
- return model

Procedure to make predictions

- Procedure getPredictonsFromModel (model, X)
- predictions = model.predict(X)
- return predictions
- epochs = 100
- neurons = 50
- predictions = empty 16

Fit the LSTM model

- model = LSTMAlgorithm (train, epoch, neurons)

Make predictions

- pred = model.predict(train)

Validate the model

- n = len(dataset)
- error = 0
- for i in range(n): error += (abs(real[i] - pred[i])/real[i]) * 100
- accuracy = 100 - error/n

III. EXPERIMENT AND RESULT

Our framework's aim was to find out which time period is ideal for predicting a company's future share price in a

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particular sector. Our goal is to estimate future prices and calculate the company's potential growth across various time periods. After that, we look at the forecast accuracy for each business in each sector. As a result, we can determine which time period is optimal for predicting the future of that particular sector.

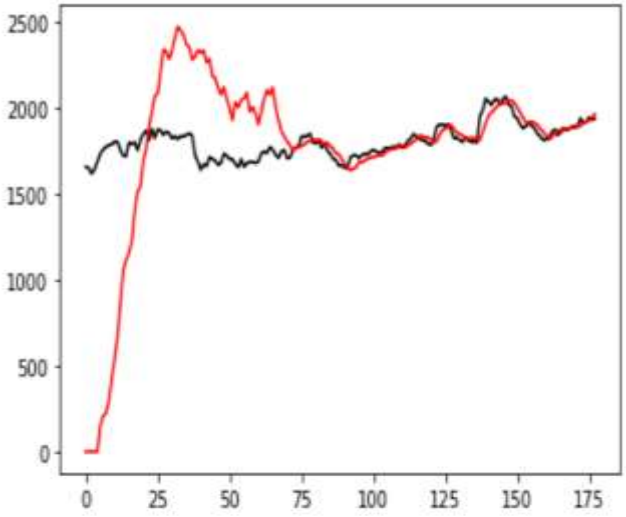


Fig 2. Stock prediction of the Nifty50 dataset.

The results show that, for almost all sectors, the error level decreases rapidly when the test data is kept for longer durations. As a result, we recommend using this LSTM-based model to forecast stock prices using long-term historical data.

Test Cases:
The test cases used in the stock price prediction are
Google

Attribute Name	Min	Max
Open	87.74	1005.49
Low	86.37	996.62
High	89.29	1008.61
Close	87.58	1004.28

Table 1. Min and Max value of google dataset.

Nifty50

Attribute Name	Min	Max
Open	7735.15	12932.5
Low	7511.1	12819.35
High	8036.95	12948.85
Close	7610.25	12938.25

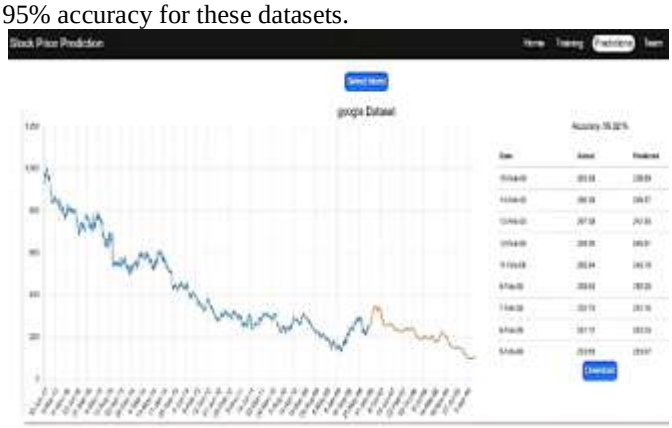
Table 2. Min and Max value of Nifty50 dataset.

Reliance

Attribute Name	Min	Max
Open	205.5	3298.0
Low	197.15	3141.3
High	219.5	3298.0
Close	203.2	3220.85

Table 3. Min and Max value of Reliance dataset.

Result:
We designed a web application for forecasting close stock prices utilizing LMS and LSTM algorithms for prediction in this project, and we are predicting the closing stock price of any given firm. We used information from Google, Nifty50, Infosys, and Reliance Stocks, and we were able to get above 95% accuracy for these datasets.



IV. CONCLUSION

Since the stock market is so volatile, investors must consider a variety of factors before investing, including public opinion, historical data, and current events. Many academics have tried utilizing various tools and methodologies to build prediction models based on machine learning algorithms to estimate the precise value of stocks, but have yet to find the optimum answer. Our technique outlines a few of the machine learning methodologies utilized by academics to estimate stock market trends and prices using machine learning and artificial intelligence algorithms while accounting for the many variables, qualities, and elements involved. In this work, the LSTM Algorithm and the LSM Algorithm are the two main approaches discussed. Hybrid approaches, which integrate two or more algorithms that are similar to one another, such as LSM and LSTM, have also been used to build prediction models for the same. To build a hybrid system model for stock market price prediction, any of the approaches can be used; however, the system must be created in such a manner that accuracy and performance can be enhanced while computational complexity is lowered.

Based on their assessment variables and the datasets utilized for their study, each model has its own benefit and disadvantage over the others. Some models perform better when historical data is used, while others perform better when sentiment data is used. According to the literature review, the fusion algorithms predicted results with more precision than any of the other models tested. They take into account the key properties of the several approaches that make them up, therefore they take less time to compute than other prediction models.

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