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Stock Price Prediction Using Machine Learning

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ABSTRACT: The primary objective of this proposed system is to discover the optimum model for predicting stock market value. A gradient-based back propagation neural network strategy is proposed in this paper to enhance stock price forecast optimization. The goal of the back propagation neural network approach is to adaptively calculate the learning rate and training cycle parameters in order to acquire the optimal value in the process of stock data training in order to achieve accuracy in prediction. In this paper, we will propose and discuss a more robust solution for predicting stock movement with more accuracy. The first factor we considered was a data collection of stock market prices, which we used as an input for stock price history. As a result, our administrator may upload stock price history, including the open, highest, lowest, and closing prices for the day. It focuses on data pre-processing as well.Furthermore, the proposed article investigates the use of the prediction system in real-world scenarios, as well as difficulties related to the correctness of the overall values provided. The output of backpropagation is the ultimate projected rate. The suggested system may generate a stock price prediction list and a graph of the prediction table so that the user can see the final projected result. Stock market institutions will benefit greatly from good stock prediction since it will bring real-world answers to the challenges that stock investors encounter.

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

I. INTRODUCTION

People can buy and sell currencies, stocks, shares, and derivatives on virtual platforms backed by brokers in the financial market, which is a dynamic and complex system. The stock market allows investors to purchase shares in public firms through exchange or over-the-counter trading. This market has provided investors with the opportunity to make money and live a wealthy life by investing modest quantities of money at low risk compared to the risk of starting a new business or the requirement of a high-paying job. Many variables influence stock markets, resulting in considerable volatility and uncertainty. Although people may accept orders and send them to the market, automated trading systems (ATS) that are run by computer programs can perform better and with more momentum than humans in submitting orders. When creating an ATS, many factors are taken into accounts, such as the trading strategy to be used, complex mathematical functions that reflect the state of a specific stock, machine learning algorithms that enable the prediction of future stock value, and specific news about the stock being studied.

Time-series prediction is a commonly utilized approach in a variety of real-world applications, including weather forecasting and financial market forecasting. It predicts the result in the following time unit using continuous data over some time. In reality, many time series prediction algorithms are useful. Recurrent Neural Networks (RNN) and their special types, Long-short Term Memory (LSTM) and Gated Recurrent Units, are presently the most often used algorithms (GRU). The stock market is a common area where time-

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series data is presented, and many scholars have studied it and developed numerous theories. The LSTM model is utilized to forecast the stock price in this project.

II. IMPLEMENTATION

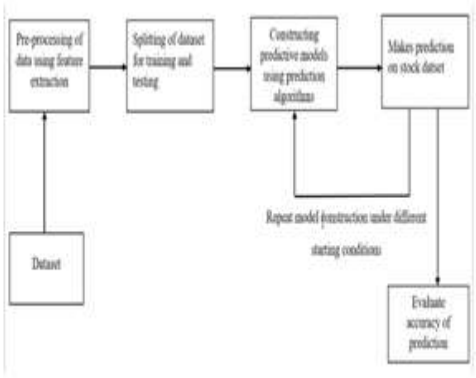


Fig i. Architectural Design

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.

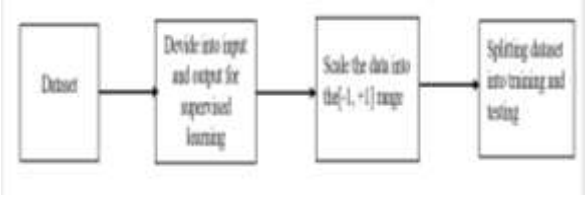
Pre-processing: The following steps are included in this project:

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 thecode 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 LSTMAlgorithm (train, test, train, size, epochs)

• X = train

• y = test

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• 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

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.

III. 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 85% accuracy for these datasets.

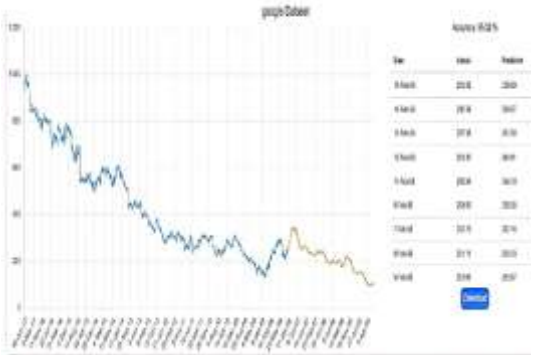

Fig.1Stock price prediction result.

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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