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Stock Price Trend Forecasting Using Machine Learning

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Abstract - This research project explores the challenging domain of stock price prediction by leveraging the capabilities of neural networks. In an ever-evolving financial landscape, the goal is to develop a robust model capable of analyzing historical stock data to identify intricate patterns and trends, thereby informing future price movements. By integrating data science with financial analysis, this endeavor aims to provide investors with valuable insights to help them navigate the complexities of the stock market.

Utilizing machine learning algorithms, particularly neural networks, the model examines extensive sets of historical stock data, considering factors such as past price trends, trading volumes, and relevant financial indicators. Techniques including regression, time-series analysis, and neural networks are employed to uncover complex relationships within the data, enhancing the model's predictive capabilities.

The model is meticulously trained on historical data to extract insights from past market behaviors. Subsequently, it undergoes rigorous testing on unseen data to evaluate its predictive accuracy. Continuous refinement and optimization strategies are implemented to ensure the model's adaptability to the ever-changing dynamics of the market.

Ultimately, this project aspires to equip investors with a powerful tool for making informed decisions in the face of the unpredictable nature of financial markets. By combining the precision of neural networks with the complexities of stock market analysis, the research aims to contribute to the advancement of stock price forecasting methodologies.

I. INTRODUCTION

In the dynamic world of financial markets, predicting stock prices has always been a significant challenge. Utilizing the power of machine learning, this project aims to develop a robust model for stock price prediction. By analyzing historical stock data and incorporating various features, the model seeks to identify patterns and trends that can inform future price movements. At the intersection of data science and financial analysis, this endeavor aims to provide investors with valuable insights to navigate the complexities of the stock market.

This project leverages machine learning algorithms to analyze vast sets of historical stock data, considering factors such as past price trends, trading volumes, and relevant financial indicators. By employing techniques like regression, time-series analysis, and neural networks, the model aims to uncover complex relationships within the data. It undergoes rigorous training on historical data to learn from past market behaviors, followed by testing on unseen data to evaluate its predictive accuracy. Continuous refinement and optimization ensure the model's adaptability to the evolving market dynamics.

Ultimately, this project aspires to provide investors with a valuable tool for making informed decisions in an unpredictable financial landscape, combining the precision of machine learning with the intricacies of stock market analysis.

II. LITERATURE SURVEY

1. Survey of stock market prediction using machine learning approach. Authors: Ashish Sharma ; Dinesh Bhuriya ; Upendra Singh 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA)

Stock market is basically nonlinear in nature and the research on stock market is one of the most important issues in recent years. People invest in stock market based on some prediction. For predict, the stock market prices people search such methods and tools which will increase their profits, while minimize their risks.

Prediction plays a very important role in stock market business which is very complicated and challenging process. Employing traditional methods like fundamental and technical analysis may not ensure the reliability of the prediction. To make predictions regression analysis is used mostly. In this paper we survey of well-known efficient regression approach to predict the stock market price from stock market data based. In future the results of multiple regression approach could be improved using more number of variables.

2. Short-term prediction for opening price of stock market based on self adapting variant PSO-Elman neural network

Authors: Ze Zhang ; Yongjun Shen ; Guidong Zhang ; Yongqiang Song ; Yan Zhu, 2017 8th IEEE International Conference on Software Engineering and Service Science (ICSESS)

Stock price is one of intricate non-linear dynamic system. Typically, Elman neural network is a local recurrent neural network, having one context layer that memorizes the past states, which is quite fit for resolving time series issues. Given this, this paper takes Elman network to predict the opening price of stock market. Considering that Elman network is limited, this paper adopts self-adapting variant PSO algorithm to optimize the weights and thresholds of network. Afterwards, the optimized data, regarded as initial weight and threshold value, is given to Elman network for training, accordingly the prediction model for opening price of stock market based on self-adapting variant PSO-Elman network is formed. Finally, this paper verifies that model by some stock prices, and compares with BP network and Elman network, so as to draw the result that shows the precision and stability of this predication model both are superior to the traditional neural network.

3. Combining of random forest estimates using LSboost for stock market index prediction

Authors: Nonita Sharma; Akanksha Juneja,2017 2nd International Conference for Convergence in Technology (I2CT).

This research work emphasizes the prediction of future stock market index values based on historical data. The experimental evaluation is based on historical data of 10 years of two indices, namely, CNX Nifty and S&P Bombay Stock Exchange (BSE) Sensex from Indian stock markets. The predictions are made for 1-10, 15, 30, and 40 days in advance. This work proposes to combine the predictions/estimates of the ensemble of trees in a Random Forest using LSboost (i.e. LS-RF). The prediction performance of the proposed model is compared with that of well-known Support Vector Regression. Technical indicators are selected as inputs to each of the prediction models. The closing value of the stock price is the predicted variable. Results show that the proposed scheme outperforms Support Vector Regression and can be applied successfully for building predictive models for stock prices prediction.

4. Using social media mining technology to assist in price prediction of stock market

Authors: Yaojun Wang ; Yaoqing Wang,2016 IEEE International Conference on Big Data Analysis (ICBDA).

Price prediction in stock market is considered to be one of the most difficult tasks, because of the price dynamic. Previous study found that stock price volatility in a short term is closely related to the market sentiment; especially for small-cap stocks. This paper used the social media mining technology to quantitative evaluation market segment, and in combination with other factors to predict the stock price trend in short term. Experiment results show that

by using social media mining combined with other information, the stock prices prediction model can forecast more accurately.

5. Stock market prediction using an improved training algorithm of neural network

Authors: Mustain Billah; Sajjad Waheed; Abu Hanifa,2016 2nd International Conference on Electrical, Computer & Telecommunication Engineering (ICECTE).

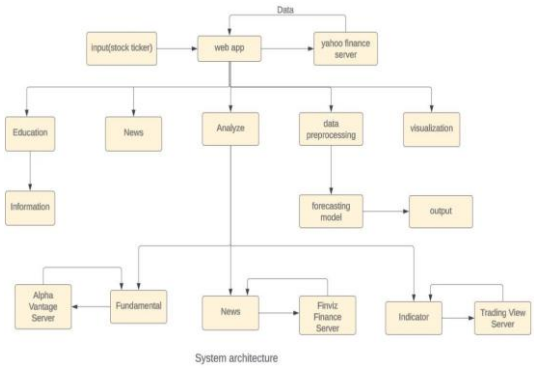
Predicting closing stock price accurately is an challenging task. Computer aided systems have been proved to be helpful tool for stock prediction such as Artificial Neural Net-work(ANN), Adaptive Neuro Fuzzy Inference System (ANFIS) etc. Latest research works prove that Adaptive Neuro Fuzzy Inference System shows better results than Neural Network for stock prediction. In this paper, an improved Levenberg Marquardt(LM) training algorithm of artificial neural network has been proposed. Improved Levenberg Marquardt algorithm of neural network can predict the possible day-end closing stock price with less memory and time needed, provided previous historical stock market data of Dhaka Stock Exchange such as opening price, highest price, lowest price, total share traded. Morever, improved LM algorithm can predict day-end stock price with 53% less error than ANFIS and traditional LM algorithm. It also requires 30% less time, 54% less memory than traditional LM and 47% less time, 59% less memory than ANFIS.

6. Efficacy of News Sentiment for Stock Market Prediction.

Authors: Sneh Kalra ; Jay Shankar Prasad,2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COMITCon).

Stock Market trend prediction will always remain

a challenging task due to stochastic nature. The enormous amount of data generated by the news, blogs, reviews, financial reports and social media are considered a treasure of knowledge for researchers and investors. The present work focuses to observe fluctuations in stock



System architecture

prices with respect to the relevant news articles of a company. In this paper, a daily prediction model is proposed using historical data and news articles to predict the Indian stock market movements. Classifier Naïve Bayes is used to categorize the news text having negative or positive sentiment. The count of the positive and negative sentiment of news articles for each day and variance of adjacent days close price along with historical data is used for prediction purpose and an accuracy ranging from

65.30 to 91.2 % achieved with various machine learning techniques

7. Stock Market Movement Prediction using LDA- Online Learning Model

Authors:Tanapon Tantisripreecha ; Nuanwan Soonthomphisaj, 2018 19th IEEE/ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD)

In this paper, an online learning method namely LDA-Online algorithm is proposed to predict the stock movement. The feature set which are the opening price, the closing price, the highest price and the lowest price are applied to fit the Linear Discriminant Analysis (LDA). Experiments on the four well known NASDAQ stocks (APPLE, FACBOOK GOOGLE, and AMAZON) show that our model provide the best performance in stock prediction. We compare LDA-online to ANN, KNN and Decision Tree in both Batch and Online learning scheme. We found that LDA-Online provided the best performance. The highest performances measured on GOOGLE, AMAZON, APPLE FACEBOOK stocks are 97.81%, 97.64%, 95.58%

and 95.18% respectively.

III PROPOSED SYSTEM

Input: Input include stock name, stock ticker.

Yahoo finance: This is API used for downloading the datasets of specific stock that user want to forecast.

Visualization: Visualization includes geometrical representation of historical as well as current stock prices. It also includes geometrical representation of technical indicators based on historical closing prices of stock in daily time frame. It contains three indicators as following
1.BB: It is a technical indicator which indicates if stock is over bought or over sold.
2.SMA: It is a technical indicator which indicates the simple average of past 11 closing prices in daily time frame.
3.Exponential moving average: It is a technical indicator which indicates the exponential average of past 11 closing prices in daily time frame.

Forecasting Model: It includes LSTM neural network which is well-suited for capturing temporal dependencies and patterns in sequential data, making them a valuable tool for predicting stock prices. It takes closing prices as input and forecast price.

Education : It includes all information about stocks, how stock prices moves, fundamental analysis, technical analysis, reading candelistick chart, chart patterns, technical indicators

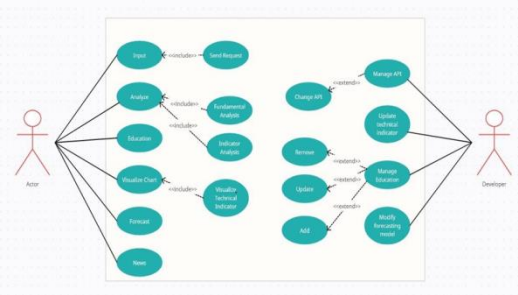
News : It includes news about companies , industries , economic indicators, and global events that impact the markets. It also provides users with the latest updates,trends , and analysis in the financial world.

Analyze : Technical analysis is a method of forecasting the direction of prices through studying historical data including price and volume charts.

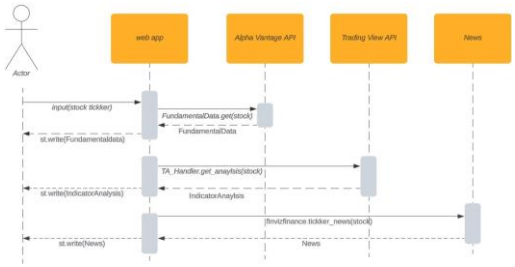
Output: It is predicted value of stock by the forecasting model.

IV HIGH LEVEL SYSTEM DESIGN

1. Use Case Diagram



i.Actors:



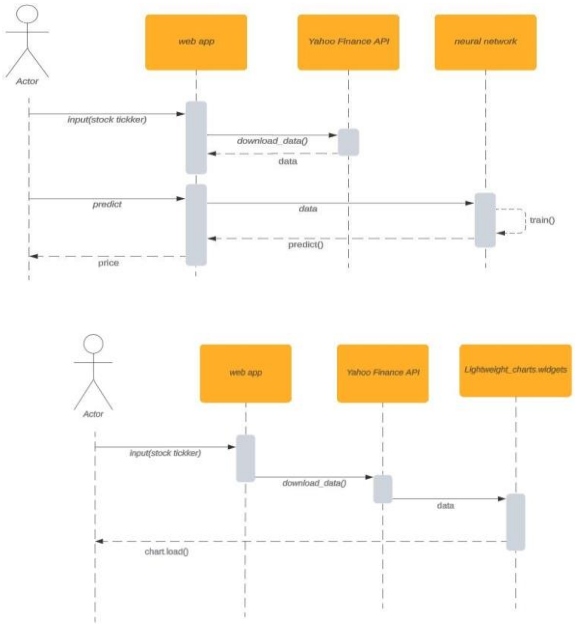
User: The primary actor interacting with the application.
Developer: The developer that handles the API used for downloading datasets user's requests.

ii. Use-Case
a. Input: It allows the user to give input to the web app.
b. View Data: Enables users to view downloaded datasets.
c. Visualize Chart: It allows user to visualize the stock prices in best possible way.
d. Forecast: It allows user to forecast future price of stocks.
e. Modify forecasting model: It allows developer modify and tune the forecasting model.
f. Update technical indicator: It allows developer to modify and tune the technical indicators and add new technical indicator
g. Manage Education : Focus should be on building a strong foundational knowledge in finance to make informed investment decisions , not on unrealistic predictions of future market movements

h. Manage API : Many financial data providers offer APIs that allow you to download historical and real time stock and data.

2. Sequence Diagram:

This sequence diagram shows how a stock market forecasting system might use a neural network to predict future stock prices. The system starts by downloading historical stock data for the stock of interest. This data is then fed into the neural network, which is trained to identify patterns in the data that can be used to predict future prices. Once the neural network is trained, the system can use it to predict the stock price for a future date.



Web App is used to download data from the real network. This data will then be used to train the neural network, forecast the stock price and visualize the data. The web app also provides an interface for the user to input the stock ticker and view the forecast.

API is used to download data for the specified stock ticker, visualize the downloaded data, forecast the stock price based on the downloaded data, predict the stock price for a future date, and train the neural network to forecast stock prices.

Neural Network is used to forecast stock prices. It takes the downloaded data as input and outputs a prediction of the stock price for a future date. The neural network is trained on historical data to learn how to identify patterns in the data that can be used to predict future stock prices.

IV. CONCLUSION

In conclusion, the application of machine learning in stock market forecasting represents a significant step towards harnessing the power of data-driven insights in the complex and ever-changing world of financial markets. Through the development and implementation of sophisticated predictive models, this project has demonstrated the potential to enhance investment decision-making, improve trading strategies, and mitigate risks associated with stock market investments. The amalgamation of diverse data sources and the continuous fine-tuning of machine learning models have contributed to the creation of more accurate and adaptable forecasting tools.

While the results of this project are promising, it is essential to acknowledge the inherent challenges and uncertainties associated with financial markets, as well as the limitations of any predictive model. Stock prices are influenced by a multitude of unpredictable factors, and market conditions can change rapidly. Therefore, it is imperative for stakeholders to approach machine learning-based forecasts with a degree of caution, understanding that these tools are not infallible and require regular updates and recalibrations to remain effective.

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Nevertheless, the contribution of this project to the field of stock market forecasting is undeniable. It not only empowers investors, traders, and financial institutions with the tools to make data-informed

decisions but also highlights the potential for continued innovation and development in this domain. As technology and data analytics continue to evolve, machine learning remains a valuable asset for those navigating the stock market, offering the potential for improved performance, better risk management, and a more profound understanding of the intricate dynamics of financial markets.

V. REFERENCES

[1] Murtaza Roondiwala; Harshal Patel; Shraddha Varma; “Predicting Stock Prices Using LSTM” in Undergraduate Engineering Students, Department of Information Technology, Mumbai University, 2015.

[2] Ashish Sharma; Dinesh Bhuriya; Upendra Singh, "Stock market prediction using machine learning approach " 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA).

[3] Ze Zhang; Yongjun Shen ; Guidong Zhang ; Yongqiang Song ; Yan Zhu, "Short-term prediction for opening price of stock market based on selfadapting variant PSO-Elman neural network": 2017 8th IEEE International Conference on Software Engineering and Service Science (ICSESS).

[4] Nonita Sharma; Akanksha Juneja, "Combining of random forest estimates using LSboost for stock market index prediction", 2017 2nd International Conference for Convergence in Technology (I2CT).

[5] Sneh Kalra; Jay Shankar Prasad, "Efficacy of News Sentiment for Stock Market Prediction" 2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COMITCon).

[6] Tanapon Tantisripreecha; Nuanwan Soonthomphisaj,"Stock Market Movement Prediction using LDA-Online Learning Model" 2018 19th IEEE/ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD).

[7] Vijayvergia; David C. Anastasiu, "Stock Price Prediction Using News Sentiment Analysis"2019 IEEE Fifth International Conference on Big Data Computing Service and Applications.

[8] S. Dinesh, A.M.S. Rama Raju, S. Rahul , O. Naga Sandeep , Mr. N D S S Kiran Relangi, "STOCK PRICE PREDICTION USING LSTM" 2021.