



ENHANCING STOCK MARKET PREDICTION USING MACHINE LEARNING

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Abstract: Stock Market Prediction Using Machine Learning is a research area that leverages various data-driven techniques to forecast stock prices and trends. This study explores the application of machine learning algorithms, such as neural networks, decision trees, and support vector machines, to analyze historical stock market data. By training these models on past price movements, trading volumes, and other relevant factors, it aims to predict future stock prices and market trends. The research focuses on evaluating the performance of these algorithms and their potential for providing valuable insights to investors and traders. Ultimately, the goal is to improve the accuracy of stock market predictions, enhancing decision-making in the financial markets.

Technical Keywords – Stock Prediction , Data Analysis, Neural Language Processing, Machine Learning.

I. INTRODUCTION

In Investment in Stock is one of the most rated businesses for making money for middle class investors. After that it is actual trading business of high class investors and traders. Company's share price is most important point for investor which always fluctuates up and downwards. Eyes always need on live price of share market and instant decision making is necessary to prevent loss of money and eventually to gain money.

For this you have to make study of the company's financial history and future agenda. Dependent on overall study related to market and company you can decide to invest. But you have limits to study because one cannot be sure about that study and analysis is correct. Company's market history, tendency of maintaining business in any period or slack, policies and announcements are the key points of Stock Rate. It is difficult field of work and need lot of experience to be a successful investor.

Various Traditional prediction techniques have not performed well and not given satisfactory outputs during the recent times. Financial Analysts are finding difficult trading since they do not comprehend which stock to buy or sell in order to maximize profit.

Individually or manually analysing all of this data is extremely challenging.

This is where we make use of machine learning algorithm.

II. MOTIVATION

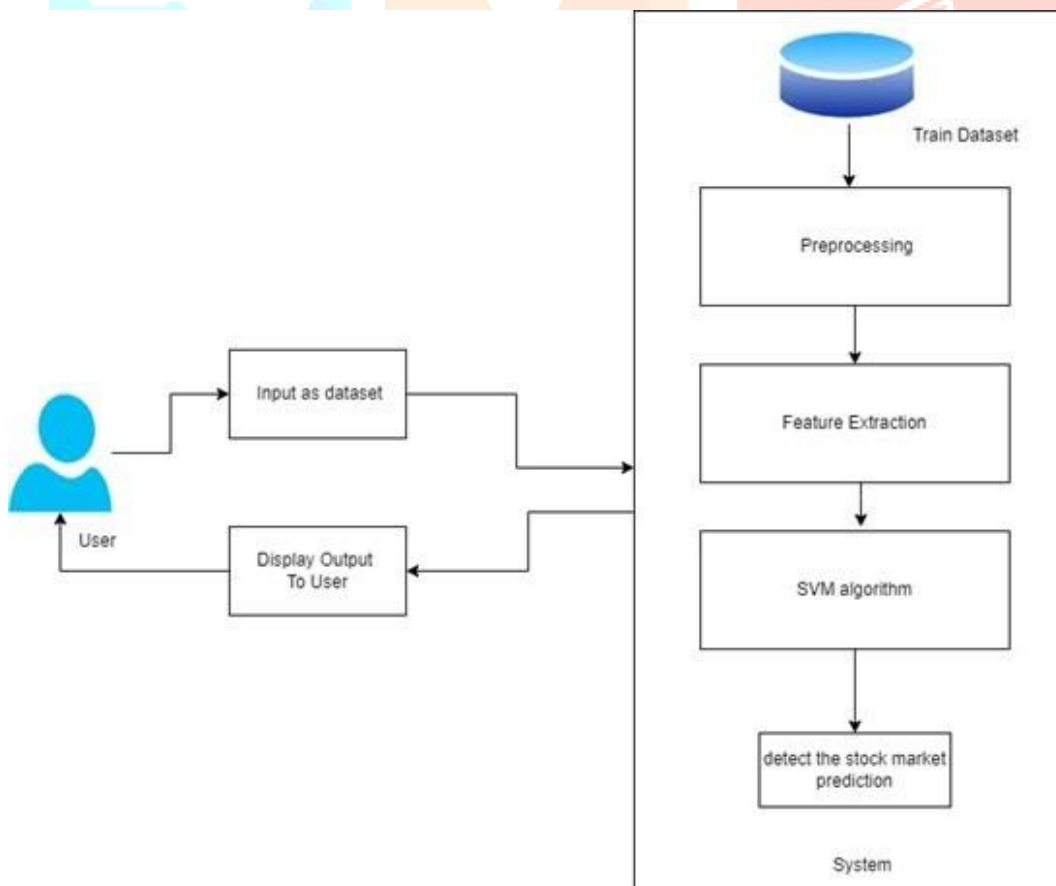
We get motivated by disadvantages of existing system.

The purpose of system is to build so that it will analyze by itself and express predictions.

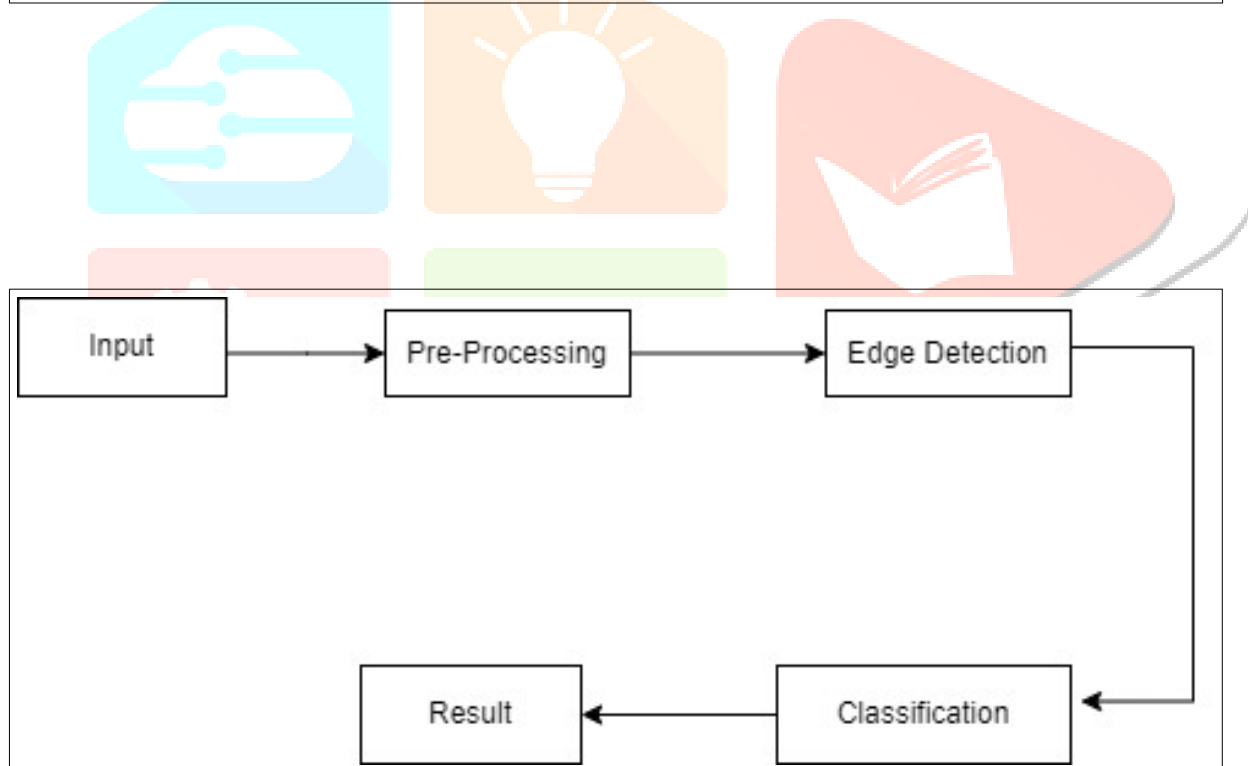
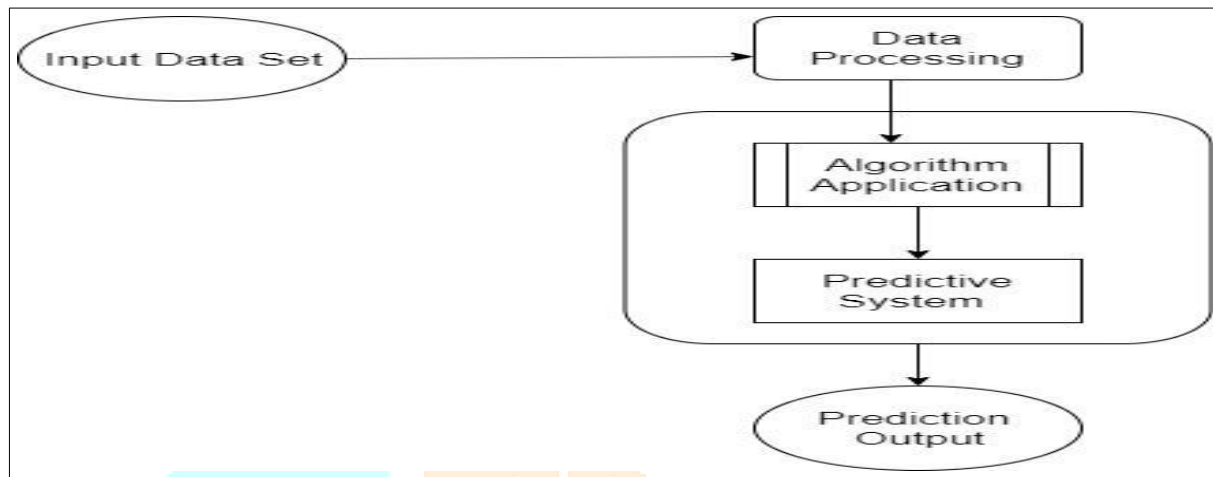
Stock price prediction is a classic and important problem. With a fruitful model for stock forecast, we can pick up knowledge about market conduct after some time, spotting patterns that would somehow or another not have been taken note. With the inexorably computational intensity of the PC, AI will be an efficient technique to take care of this issue. Nonetheless, people in general stock dataset is unreasonably restricted for some, AI calculations to work with, while requesting more highlights may cost a huge number of dollars regular. In this paper, we will present a structure in which we coordinate client expectations into the present AI calculation utilizing open verifiable information to improve our outcomes. The spurred thought is that, in the event that we know all data about today's stock exchanging (of all specific merchants), the value is predictable. Thus, if we can obtain just a partial information, we can hope to improve the present expectation parcel. With the development of the Internet, informal organizations, and online social associations, getting day by day client forecasts is practical job1. In this way, our inspiration is to structure an open help consolidating chronicled information and clients forecasts to make a more grounded model that will benefit everybody

III. SYSTEM DESIGN

3.1 SYSTEM ARCHITECTURE



3.2 DATA FLOW DIAGRAM



IV. LITERATURE SURVEY

1. Paper Name: Analysis of Investor Sentiment and Stock Market Volatility Trend

Based on Big Data Strategy

Description : In this project[1], This paper mainly studies the specific mechanism of investor sentiment affecting stock market volatility. With the help of Pollet and Wilson's theory of volatility decomposition, it performs a comparative analysis based on big data strategy and sources. This paper collects the data of web news emotion index, web search volume, social network emotion index, social network heat index, and establishes corresponding analysis index. After correlation analysis and Granger causality tests, it extracts the indicators which have significant correlation with the financial market and brings them into forecasting

analysis. The model constructs market volatility index and analyzes the correlation between investor sentiment and stock price changes. In empirical study, the deviation between stock price and value is introduced as an explanatory variable, and the logarithmic return of stock is used to measure the volatility of stock price. It is found that the stock market volatility index compounded by the stock market sentiment index has a strong predictive ability for the stock market volatility turning point in the larger turbulent situation, especially for the one to two day decline turning point ahead of schedule, and it has a strong practical role for the stock market volatility prediction, as well as for financial market risk aversion.

2.Paper Name: *Combining of Random Forest Estimates using LSboost for Stock*

Market Index Prediction

Description : In this project[2], This research work emphasizes on 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 SP 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.

3.Paper Name: Literature review on Artificial Neural Networks Techniques Application for Stock Market Prediction and as Decision Support Tools

Description : This literature review is aiming to explore the use Artificial Neural Network (ANN) techniques in the field of stock market prediction. Design: Content analysis research technique. Data sources: Information retrieved from ProQuest electronic databases. Review methods: Utilizing key terms and phrases associated with Artificial Neural Network Stock Market Prediction from 2013- 2018. Out of the 129 scholarly journal reviewed, there are 4 stock market studies met the inclusion criteria. The analysis and the evaluation includes 6 ANN derivatives techniques used to predict. Results: Findings from the reviewed studies revealed that all studies shows consistency that the accuracy rate of ANN stock market prediction is high. 2 Studies shows accuracy above 90% 2 studies shows accuracy above 50%. Conclusion: This study reveals that the ability of ANN shows consistency of an accuracy rate of stock market prediction. Four method in predicting stock market had an accuracy above 95%. The highest accuracy achieved by using Signal Processing/Gaussian Zero-Phase Filter (GZ-Filter) with 98.7% prediction accuracy

4.Paper Name: Predicting the Effects of News Sentiments on the Stock Market

Description: Stock market forecasting is very important in the planning of business activities. Stock price prediction has attracted many researchers in multiple disciplines including computer science, statistics, economics, finance, and operations research. Recent studies have shown that the vast amount of online information in the public domain such as Wikipedia usage pattern, news stories from the mainstream media, and social media discussions can have an observable effect on investors' opinions towards financial markets. The reliability of the computational models on stock market prediction is important as it is very sensitive to the economy and can directly lead to financial loss. In this paper, we retrieved, extracted, and analyzed the effects of news sentiments on the stock market. Our main contributions include the development of a sentiment analysis dictionary for the financial sector, the development of a dictionary-based sentiment analysis model, and the evaluation of the model for gauging the effects of news sentiments on stocks for the pharmaceutical market. Using only news sentiments, we achieved a directional accuracy of 70.59% in predicting the trends in short-term stock price movement.

5.Paper Name: Prediction of Stock Market by Principal Component Analysis

Description: The categorization of high dimensional data present a fascinating challenge to machine learning models as frequent number of highly correlated dimensions or attributes can affect the accuracy of classification model. In this paper, the problem of high dimensionality of stock exchange is investigated to predict the market trends by applying the principal component analysis (PCA) with linear regression. PCA can help to improve the predictive performance of machine learning methods while reducing the redundancy among the data. Experiments are carried out on a high dimensional spectral of 3 stock exchanges such as: New York Stock Exchange, London Stock Exchange and Karachi Stock Exchange. The accuracy of linear regression classification model is compared before and after applying PCA. The experiments show that PCA can improve the performance of machine learning in general if and only if relative correlation among input features is investigated and careful selection is done while choosing principal components. Root mean square error (RMSE) is used as an evaluation metric to evaluate the classification model.

6.Paper Name: Price Trend Prediction of Stock Market Using Outlier Data Mining Algorithm

Description: In this paper we present a novel data mining approach to predict long term behavior of stock trend. Traditional techniques on stock trend prediction have shown their limitations when using time series algorithms or volatility modelling on price sequence. In our research, a novel outlier mining algorithm is proposed to detect anomalies on the basis of volume sequence of high frequency tick-by tick data of stock market. Such anomaly trades always inference with the stock price in the stock market. By using the cluster information of such anomalies, our approach predict the stock trend effectively in the really world market. Experiment results show that our proposed approach makes profits on the Chinese stock market, especially in a long-term usage.

7.Paper Name: Short-term Prediction for Opening Price of Stock Market Based on Self-adapting Variant PSO-Elman Neural Network

Description: 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.

8.Paper Name: Stock Market Trend Prediction Using High-Order Information of Time Series

Description: Given a financial time series such as SP 500, or any historical data in stock markets, how can we obtain useful information from recent transaction data to predict the ups and downs at the next moment? Recent work on this issue shows initial evidence that machine learning techniques are capable of identifying (non-linear) dependency in the stock market price sequences. However, due to the high volatility and non-stationary nature of the stock market, forecasting the trend of a financial time series remains a big challenge. In this paper, we introduced a new method to simplify noisy-filled financial temporal series via sequence reconstruction by leveraging motifs (frequent patterns), and then utilize a convolutional neural network to capture spatial structure of time series. The experimental results show the efficiency of our proposed method in feature learning and outperformance with 4with the traditional signal process methods and frequency trading patterns modeling approach with deep learning in stock trend prediction.

Literature Survey Table

Publication	Year	Title	Overview	Positive aspects	Limitations
IEEE	2019	Analysis of Investor Sentiment and Stock Market Volatility Trend Based on Big Data Strategy [1].	This paper collects the data of web news emotion index, web search volume, social network emotion index, social network heat index, and establishes corresponding analysis index.	Stock market volatility prediction, as well as for financial market risk aversion.	Brings a new perspective and reference system for current market volatility risk measurement.
IEEE	2017	Combining of Random Forest Estimates using LSboost for Stock Market Index Prediction [2].	Technical indicators are selected as inputs to each of the prediction models.	In this paper, the focus is to predict the future values of stock market indices based on the previous stock values using regression.	Proposed prediction model may also be implemented in other areas like GDP forecasting, energy consumption forecasting, or weather forecasting
IEEE	2018	Literature review on Artificial Neural Networks Techniques Application for Stock Market Prediction and as Decision Support Tools [3].	This study reveals that the ability of LSTM shows consistency of an accuracy rate of stock market prediction	This study reveals that the ability of an LSTM shows consistency of an accuracy rate of stock	Future work may examine in using a broad database available also examine applying statistical approach to test whether the findings.

IEEE	2018	Predicting the Effects of News Sentiments on the Stock Market [4].	In this paper, we retrieved, extracted, and analyzed the effects of news sentiments on the stock market.	The sentiment scores obtained from the analysis of the news articles is a powerful indicator of stock movements and can be used to effectively leverage the prediction of short-term trends.	System can be improved to work on a large scale.
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V CONCLUSION

In the realm of Stock Market Prediction Using Machine Learning, our study underscores the potential of modern computational techniques to assist in forecasting stock market trends and prices. Through the application of diverse machine learning algorithms, we have shown that predictive models can be developed using historical stock data, market indicators, and relevant economic information. These models have demonstrated varying degrees of success in providing valuable insights for investors and traders. In summary, Stock Market Prediction Using Machine Learning is an evolving field with significant potential. While not without its limitations, it represents a valuable approach to navigate the complex and dynamic world of financial markets. Continued research and development in this area hold the promise of further enhancing the capabilities of machine learning models for stock market forecasting.

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VII. REFERENCE

- [1] H. Isah, "Social Data Mining for Crime Intelligence: Contributions to Social Data Quality Assessment and Prediction Methods," University of Bradford, 2017.
- [2] P. Wei and N. Wang, "Wikipedia and stock return: Wikipedia usage pattern helps to predict the individual stock movement," in Proceedings of the 25th International Conference Companion on World Wide Web, 2016, pp. 591-594: International World Wide Web Conferences Steering Committee.

- [3] E. Chong, C. Han, and F. C. Park, "Deep learning networks for stock market analysis and prediction: Methodology, data representations, and case studies," *Expert Systems with Applications*, vol. 83, pp. 187- 205, 2017.
- [4] J. Zhang, S. Cui, Y. Xu, Q. Li, and T. Li, "A novel data-driven stock price trend prediction system," *Expert Systems with Applications*, vol. 97, pp. 60-69, 2018.
- [5] L. S. Malagrino, N. T. Roman, and A. M. Monteiro, "Forecasting stock market index daily direction: A Bayesia Network approach," *Expert Systems with Applications*, vol. 105, pp. 11-22, 2018.
- [6] M. B. Patel and S. R. Yalamalle, "Stock Price Prediction Using Artificial Neural Network" *International Journal of Innovative Research in Science, Engineering and Technology*, vol. 3, pp.13755- 13762, June 2014.
- [7] Jie Wang, Jun Wang, Wen Fang. Financial Time Series Prediction Using Elman Recurrent Random Neural Networks[J]. *Computational Intelligence Neuroscience*, 20162016(12):1-14.
- [8] Available: <https://www.who.int/data/collections/> [Accessed Dec 20, 2020]
- [9] Available: <https://www.nseindia.com/> [Accessed Dec 20,2020]
- [10] Mittal, Anshul, and Arpit Goel. "Stock prediction using twitter sentiment analysis." Stanford University, CS229 (2011 <http://cs229.stanford.edu/proj2011/GoelMittal-StockMarketPredictionUsingTwitterSentimentAnalysis.pdf>) 15 (2012).
- [11] Zhang, K., Zhong, G., Dong, J., Wang, S., & Wang, Y. (2019). Stock market prediction based on generative adversarial networks. *Procedia computer science*, 147, 400-406
- [12] Chung, H., & Shin, K. S. (2018). Genetic algorithm-optimized long short-term memory network for stock market prediction. *Sustainability*, 10(10), 3765