



## STOCK PRICE PREDICTION USING MACHINE LEARNING

<sup>1</sup>Miss. Archana Mate , <sup>2</sup>Walunj Gayatri , <sup>3</sup>Bagwan Ramiza , <sup>4</sup>Pawar Pratiksha

Department of Information Technology

Pravara Rural Engineering College, Loni, India

**Abstract:** In this article, we try to apply a machine learning strategy to forecast stock prices. Stock price forecasting uses machine learning effectively. The objective of stock price forecasting is to help investors make more informed and precise financial decisions. To improve stock forecast accuracy and generate lucrative trades, we advise using a stock price prediction system that incorporates mathematical operations, machine learning, and other external aspects. The stock market is notoriously unpredictable, making its forecasting a difficult undertaking. Stock prices are influenced by a variety of important physical, psychological, intellectual, and other important aspects in addition to economic variables. In this study, the Auto Regressive Integrated Moving Average (ARIMA) Model is used to forecast stock prices. Using published stock data that has been obtained from Yahoo Finance, stock price prediction models have been created and tested. The outcomes of the experiment support the claim that the ARIMA Model may reasonably predict stock values for a brief period of time.

**IndexTerms -** Machine Learning, Stock Market, Predictive Analysis, Financial Time Series Forecasting

### I.INTRODUCTION

The stock market is one of the most important components of a market economy. This is primarily because it establishes the framework for publicly traded corporations to raise money from investors who contribute to purchase company stock. The stock market is growing quickly because to industry improvements. Investors must regularly take into account the differences present in the stock market if they are to receive returns (profits). Since the stock market is so unpredictable, making predictions about it is difficult. Many variables, including economic, physical, psychological, rational, and other significant characteristics, affect stock values. Despite the difficulty of predicting stock trends, investors continue to develop innovative strategies to reduce investment risk and boost the likelihood that their investments will be profitable. The stock market's volatility makes it an intriguing area for researchers to develop new forecasting algorithms. An essential subset of prediction algorithms and functions is time-series analysis. It is thought to be a useful tool for predicting stock market and logistical trends. An investor acquires information on prior stock movements, regular changes, and several other elements that affect a company's capital before making any investment. A dynamic method for predicting the future values of a time-series is the ARIMA model. It is suggested to use the ARIMA model to anticipate stock prices since it is crucial to find a model to analyse stock price patterns with sufficient information for decision-making. the stock market's high point. Eventually, the index will continue to rise as investors and the stock brokerage firm watch and record the variations. This will aid in the strategic decision-making process for both new and seasoned investors. That can be done with experience and ongoing investor observation. The three-step ARIMA algorithm has been offered as a solution to the aforementioned problems Model identification, model estimate, and forecasting are the first three steps. Uma Devi, B and et al. Ayodele Adebisi, A and others P. Pai and et. al[3] Wei, L.Y., and Wang, J.J. and et al Due to the complexity of the stock market, authors explain how to implement financial forecasting. Predicting stock prices is one of the most challenging tasks. According to Atsalakis, G.S. and et al. many investors want to adopt any forecasting technique that would guarantee quick profits and reduce investing risk in the stock market. A driving force for academics to gradually create new predictive models is still present. As in previous years, numerous models and approaches have been created to anticipate stock prices, according to Mitra, S.K. Atsalakis, G.S., and et. al. One of them is an artificial neural network (ANN) model, which is well- liked for its capacity to infer solutions from unknown data and learn patterns from data. In their literature for stock price prediction, a few related works on ANNs models are included. Recently, according to Wang, J.J. and et. al[4], hybrid techniques have also been used to enhance stock price forecasting models by taking advantage of their special strengths. ANNs is from the viewpoint of artificial intelligence. ARIMA models have been created from the perspective of statistical models. In general, it is mentioned in their literature that the prediction can be done using statistical and artificial intelligence techniques. According to Merh, N. et al., Sterba, J. et al., and Javier, C. et al ARIMA models are recognised to be reliable and effective in financial time series forecasting, particularly for short-term prediction when compared to the widely used ANNs approaches. They are widely utilised in the economics and finance industries. There is also discussion of other statistical models, such as conditional heteroskedasticity (GARCH), generalised autoregressive and exponential smoothing. The lengthy process of developing ARIMA models for short-term stock price prediction is discussed in our suggested

research. The outcomes from real-world data illustrated the ARIMA models' potential strength in providing investors with short-term predictions that could support investment decision-making. The remainder of the essay is structured as follows: A basic description of the ARIMA model is provided in Section 2. Section 3 outlines the procedures (methodology), and Part 4 examines the outcomes of the experiments. Section 5 of the study concludes with observations.

## II. RELATED WORK

- I. **Research on Stock Price Prediction Method Based on Convolutional Neural Network** In this paper, in order to meet the needs of the financial industry and the financial market, effectively improve the rate of return on funds and avoid market risks, this paper proposes a stock price prediction model based on convolution neural network, which has obvious self-adaptability and self-learning ability.
- II. **Stock Price Trend Prediction Model Based on Deep Residual Network and Stock Price Graph.** In this paper, we Consider that people often use stock price graph to make decisions, this paper introduce a deep residual network (ResNet) model for prediction, using the stock price graph as input.
- III. **Short-term prediction for opening price of stock market basedon self-adapting variant PSO-Elman neural network.** 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.
- IV. **Using social media mining technology to assist in price prediction of stock market.** Nowadays, as new reviews are posted daily on social media, there maybe value in using web opinions to improve the performance of stock price prediction. To this end, we use logistic regression to screen the chip indicators and establish a basic stock price prediction model.

## III. PROPOSED SYSTEM

The Twitter API is used to extract tweets related to the stock of interest. The extracted tweets are preprocessed to remove noise and irrelevant information. Cleaned data is passed through a sentiment analysis module using Natural Language Processing (NLP) techniques to obtain sentiment scores.

The sentiment analysis module provides sentiment scores that indicate the sentiment (positive, negative, neutral) of the tweets. The technical analysis module analyzes historical stock data to generate technical indicators. The technical indicators provide insights into the historical price and volume behavior of the stock. The feature extraction step combines the sentiment scores and technical indicators into a feature vector.

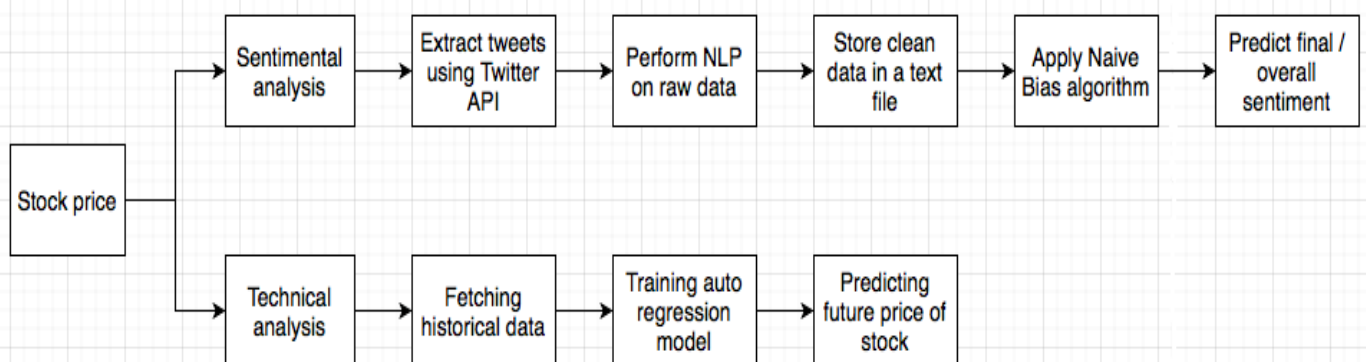


Figure 1. System Architecture

**Algorithm:**

- NLP (Natural Language Processing), Naive Bayes, time series analysis, auto regression, and ARIMA (AutoRegressive Integrated Moving Average) models can be utilized in a stock prediction system:
- NLP for Sentiment Analysis:
  1. NLP techniques are applied to analyze textual data, such as news articles, social media posts, or financial reports, to extract sentiment or opinion about a particular stock.
  2. Sentiment analysis algorithms are used to classify the sentiment of the text as positive, negative, or neutral.
  3. By analyzing sentiment from various sources, it helps to gauge the market sentiment or public opinion about the stock, which can influence its price movement.
- Naive Bayes for Sentiment Classification:
  1. Naive Bayes is a popular machine learning algorithm used for text classification, including sentiment analysis.
  2. In the context of stock prediction, Naive Bayes can be trained on labeled sentiment data to classify new textual data (e.g., tweets, news headlines) into sentiment categories.
  3. By assigning sentiment labels (positive, negative, neutral) to the text data, Naive Bayes contributes to understanding the sentiment-related factors affecting stock prices.
- Time Series Analysis:
  1. Time series analysis is employed to model and predict the behavior of stock prices over time.
  2. It involves analyzing historical stock price data to identify patterns, trends, and seasonality.
  3. Techniques such as moving averages, exponential smoothing, and trend analysis are used to extract useful information from the time series data.
  4. Time series analysis provides insights into the stock's historical price movements and helps identify potential future trends.
- Auto Regression:
  1. Auto Regression (AR) is a time series modeling technique that uses past values of a variable to predict its future values.
  2. AR models assume that the future values of a variable are linearly dependent on its past values.
  3. By estimating the coefficients of the autoregressive terms, AR models can make predictions about the future stock prices based on its own past behavior.
  4. The order of the AR model, denoted as AR(p), determines the number of lagged terms considered in the prediction.
- ARIMA Model:
  1. ARIMA (AutoRegressive Integrated Moving Average) is a popular time series model that combines autoregressive (AR), differencing (I), and moving average (MA) components.
  2. ARIMA models are capable of capturing both short-term and long-term dependencies in the data.
  3. In the context of stock prediction, ARIMA models can be trained on historical stock price data to forecast future price movements.
  4. The parameters of the ARIMA model (p, d, q) define the number of autoregressive terms (p), the degree of differencing (d), and the number of moving average terms (q) used in the model.
- In a stock prediction system that combines technical and sentimental analysis, NLP and Naive Bayes are used to assess market sentiment. Time series analysis is then applied to historical stock price data to identify trends and patterns. Auto regression and ARIMA models are utilized to make predictions about future stock prices based on the observed patterns and sentiment analysis results. The combined analysis from these models helps in understanding and forecasting the potential movement of stock prices

**IV. RESULTS AND DISCUSSION**

The subsection below discusses each stock index's experimental findings. Results of the ARIMA Model for Predicting Nokia Stock Price Table 3 displays the outcomes of the ARIMA (2, 1, 0) projected values, which is thought to be the best model for the Nokia stock index. Figure 2 shows graphically how well the chosen ARIMA model performed when comparing the forecasted price to the actual stock price. It is clear from the graph that the performance is acceptable. SAMPLE OF EMPIRICAL ARIMA (2,1,0) RESULTS FOR THE NOKIA STOCK INDEX is presented in TABLE III. Periodic Sample Actual Values Estimated Values.



Figure2. Stock market Prediction

## V. CONCLUSION

In-depth steps for creating an ARIMA model for stock price prediction are presented in this research. The experimental findings produced using the best ARIMA model showed that ARIMA models had a good ability to predict stock values on a short-term basis. This might help stock market investors choose winning investments. With the results obtained, ARIMA models can compete with new forecasting methods for short-term prediction fairly effectively.

## VI. References

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