International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 06 | June - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

Stock Market Prediction Using Machine Learning

Ms.Meka Srivani
Student, Amity University Chhattisgarh, Raipur
srivanimeka@gmail.com

Mr.Adwin Manhar
Professor, Amity University Chhattisgarh, Raipur
amanhar@rpr.amity.edu

ABSTRACT

In the finance industry, the stock market is an important activity. Its demand is consistently increasing. Predicting the stock market is a method for estimating the expected worth of a company's shares or other financial assets, which are traded on a stock exchange. Investing in the stock market can be profitable, but success depends on analyzing current and past market trends. A present inflated market economy has generated several variables that require contemplation before executing a profitable stock market transaction.

The process of manually analyzing all of these variables and taking into account all the affecting factors is both time-consuming and prone to errors. Due to the seeming complexity and chaos of the system, a Machine Learning approach would be the most optimal choice for its analysis. This project employs Machine learning to predict various aspects of a stock or index, including potential values of the opening and closing prices. This will help investors and traders make better decisions in a timelier manner.

Keywords: Machine Learning, Stock Price, Prediction, Artificial Neural Network (ANN)

INTRODUCTION

The Stock Market is the accumulation of stockbrokers, traders, and investors who sell buy, or share trades. There are so many companies that provide their stock list on the market; these make their stocks attractive to investors. Analysis and prediction of the stock market are an attempt to determine the company's shares' future value or other financial instruments traded on a stock exchange. The stock market is an integral part of the economy of the country and plays a vital role in the growth of the industry and commerce of the country which eventually affects the economy of the country. Investors and industry are engaged in the stock market and want to know if certain stocks will rise or fall over a while. The stock market is the initial source for any

corporation to raise funds for business growth. It is based on the concept of demand and supply. If the demand for a company's stock is higher, then the company's share price increases; if the demand for a company's stock is low, then the share price decreases. Due to the involvement of many industries and companies, it contains very large sets of data from which it is difficult to extract information and analyze their trend of work manually.

Stock market analysis and forecasting will show market patterns and predict the optimal time for purchasing the stock. A precise prediction of a stock's future price could result in a substantial profit. This is done using large historical market data to represent varying conditions and confirm that the time series patterns have statistically significant predictive power for the high probability of lucrative deals as well as profitable returns for the on-par business investment.

Machine learning is a technology for data analysis that automates the building of analytical models. Employing algorithms that learn from data, enables computers to discover hidden insights without being directed to where to look. Application of Machine learning algorithms generally focuses on technical analysis, but the incorporation of the concepts of fundamental analysis in machine learning can be beneficial. This project describes how various efforts have been made in the application of machine learning to stock forecasting and also suggests new ideas that can be worked upon. More recently, there has been a lot of remarkable work concerning the topic of using machine learning algorithms to analyze pricing models and predict stock prices and index changes. Some researchers used input data from a single time series, whereas others considered the inclusion of heterogeneous market information and macroeconomic variables. Some researchers even pre-processed these input data sets before feeding them to the ANN for forecasting.

LITERATURE SURVEY

The past few decades have seen a rise in interest in the field of research surrounding stock return forecasting. In most of the cases, the researchers attempted to establish a linear relationship between the input macroeconomic variables and the stock returns. After the discovery of nonlinearity in the stock market index returns, many works of literature have come up on the nonlinear statistical modeling of the stock returns, most of them demanded that the nonlinear model be established before estimating. But since the stock market return is noisy, uncertain, chaotic, and nonlinear, ANN has evolved to be the better technique for capturing the structural relationship between a stock’s performance and its determinant factors more accurately than many other statistical techniques. Various sets of input factors are utilized in the literature to forecast stock returns. To anticipate the same set of stock return data, different input variables are used. A variety of input variables are used to predict the same set of stock return data. Some researchers used input data from a single time series, whereas others considered the inclusion of heterogeneous market information and macroeconomic variables. Some researchers even pre-processed these input data sets before feeding them to the ANN for forecasting.

RELATED WORK

[1] Kim and Han established a model for predicting the stock price index using the incorporation of artificial neural networks (ANN) and genetic algorithms (GAs) with a feature discretization of data. Their research utilizes both qualitative and quantitative data sources, including technical indicators and the progression of the daily Korean Stock Price Index (KOSPI). The sample data comprised of 2928 trading days, spanning from January 1989 to December 1998, was utilized by the researchers, who subsequently presented their chosen features and formulas. Furthermore, they applied an optimization technique similar to dimensionality reduction, which optimized feature discretization. One of their work's merits is that they used GA to optimize the ANN.

[2] Kara et al also utilized artificial neural networks and Support Vector Machines (SVM) to predict the movement of the stock price index. They used the data set of the Istanbul Stock Exchange from January 2, 1997 to December 31, 2007. In this work, the primary strength lies in the meticulous documentation of parameter adjustment procedures. The authors did not explain why their model outperformed other models in earlier publications, which is one of this work's flaws because neither the technical indicator nor the model structure is unconventional. Therefore, conducting additional validation studies, on the other datasets would prove beneficial. They provided an explanation of the operation of ANN and SVM with stock market characteristics and additionally recorded the parameter adjustments. The implementation component of our research may derive benefit from the prior work.

[3] According to Guresen et al. (2011), ANN is one of the finest methodologies for modeling the stock market because it has standard formulas and can be quickly changed to market fluctuations. ANN can pick up by example and extrapolate and interpolate what they have learned. The usage of ANN in the solution of an issue begins with a learning phase in which the network extracts patterns, resulting in the creation of a specific representation of the problem (Braga, Carvalho, & Ludermir, 2007). White (1988) created the first model for predicting stock prices based on ANN. To detect unknown regularities in stock price fluctuations, the author developed a feed-forward network. The purpose was to examine the daily returns of IBM stock to verify Fama's (1970) efficient market hypothesis, which states that stock prices follow a random walk. Even though he was unable to generate good prediction findings, the research highlighted the potential for such analysis. Since then, a huge number of experts have actively contributed to the development of prediction models that may be used in the stock market with confidence.

[4] Forecasting the stock market using hidden Markov models Both Aditya Gupta and Bhuwan Dhingra are non-student IEEE members. It is considerably more difficult to anticipate future stock prices using only historical stock data because it excludes several outlying factors (such as the state of the firm, ownership, and financial situation). The area of stock market prediction has been a prominent research area in the past,

even in current times owing to the evident interest of numerous prominent corporations. Several machine learning techniques were used in this study, with varied degrees of effectiveness. Nonetheless, the capacity of stock forecasting remains severely constrained owing to its non-stationary, seasonal, and inherently unpredictable nature.

[5] Tsibouris and Zeidenberg (1995) tested the efficient market theory by looking at six stocks on the US stock market and found that it was able to predict prices based on historical price series. Other research, such as (Kolarik & Rudorfer, 1994; Refenes, 1991; Refenes, Azema-Barac, & Zapranis, 1993), observed that ANN achieved superior prediction accuracy compared to statistical methods, such as the regression model and those obtained by the ARIMA technique.

PROPOSED SYSTEM

The proposed model should be based on the study of historical data, technical indicators, and optimizing neural network algorithms to be used in the prediction of daily stock prices. The proposed model architecture contains six input vectors representing the historical data and derived technical indicators and one output represents the next price. The process for developing a neural model that could forecast stock closing prices and near-term behavior was as follows:

1. An understanding of the problem domain and identification of key variables;

2. Preprocessing and Cleaning

Data redundancy is eliminated while interpolating or recovering missing data. This process also includes generating any helpful features from the existing ones.

3. Feature Extraction and Selection

This step involves searching in the space of possible feature subsets. We then pick the subgroup that is optimal or near-optimal concerning some objective function. This is done to avoid data set overfill/underfeed issues.

4. Data Normalization

Data must be normalized for better accuracy by ensuring that all features do not give excessive/low weightage.

5. Then we do Training with neural network

6. Testing with the data that's already been through the selection to satisfy the execution preconditions and input content required to execute.

7. Lastly, Computing predicted value

METHODOLOGY FOR CREATING A PREDICTIVE MODEL

General steps of building and predicting the value by using the Multi-Layer Perception model in the Neural Works Predict.

1. Making a Predict Model: To predict something from data. The target output can be any number in a continuous range of numbers or a specific order of numbers.

2. Model selection: The Multi-Layer Perception (MLP) model is chosen to forecast the stock price.

3. Multi-Layer Perception input training data

4. Output training data

5. Training data characteristics

6. Network parameters

7. Reviewing parameters and training the model

8. Saving the model

9. Training statistics

10. Testing a predicted model

RESULT

[Figure 1] The image that has sufficient resolution to depict Artificial Neural Network can be seen below. The transformation of input into output in a neural network is facilitated by the activation function, which is a defining characteristic of the network's interconnected information processing units. The initial stage of the neural network entails the raw input being received by the first layer, which processes it and then transmits the processed information to the hidden layer for further processing.

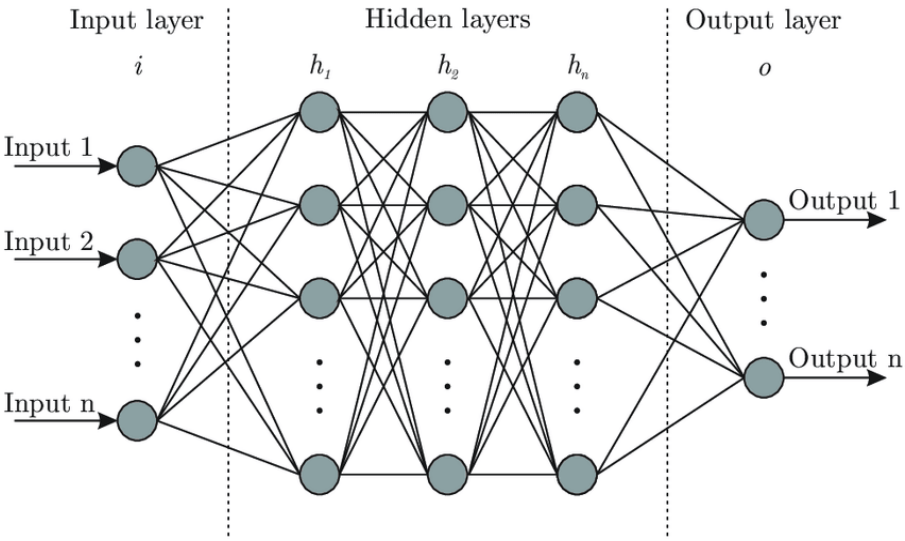

Figure 1.Artificial Neural Network

[Figure 2] Shows the prediction graph using a neural network. The graph's X-axis displays the dates from 1989 through 2025, while the Y-axis displays the market closing price. The blue graph depicts the close price history from 1989 to 2019. The orange graph reflects projected forecasts from 2019 through 2025. The information was obtained from the Yahoo server.

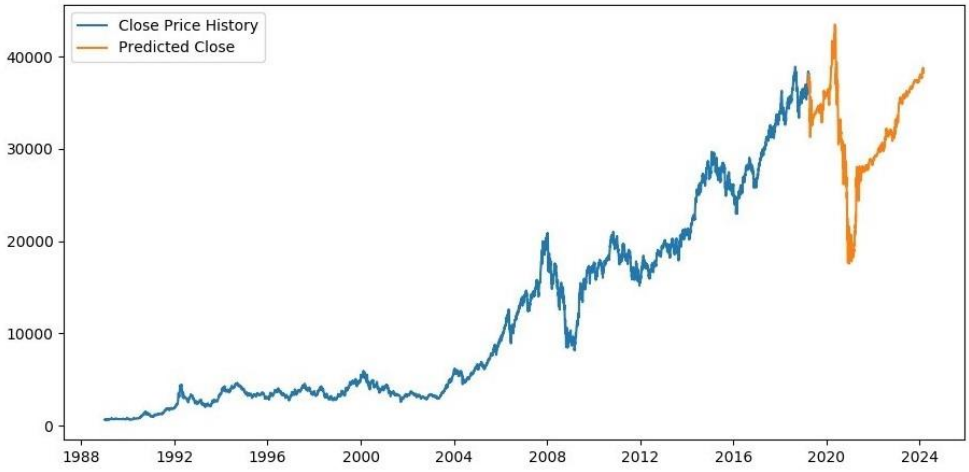

Figure 2.Stock Prediction Graph

CONCLUSION

The goal of this study was to comprehend the information available on the financial market and pinpoint the factors that affect stock prices while taking into account the numerous industries, macroeconomic and market indicators, as well as the activities and economic sectors involved. Other businesses and their stocks could be studied using the methodology that is being given. In theory, the debate over stock price predictions remains contentious and ineffective. However, from an empirical aspect, this research was quite fruitful, with some approaches for financial market prediction being created and demonstrated. The improvement of efficient trading techniques in the stock market depends heavily on the ability to forecast how stock values will change. The accurate prediction of stock prices may offer appealing benefits to investors in general. The predictions of the closing price that were made as a result of this research performed well, thus in general, the outcomes were satisfactory. Thus, the application of ANN to anticipate stock behavior and trends has proven to be a viable alternative to traditional techniques, revealing market behavior and providing privileged knowledge to investors, as well as the ability to be used alongside other techniques.

REFERENCES

[1]Kim K, Han I. Genetic algorithms approach to feature discretization in artificial neural networks for the prediction of the stock price index. Expert Syst Appl. 2000;19:125–32. https://doi.org/10.1016/S0957-4174(00)00027-0.

[2]Kara Y, Acar Boyacioglu M, Baykan ÖK. Predicting the direction of stock price index movement using artificial neural networks and support vector machines: the sample of the Istanbul Stock Exchange. Expert Syst Appl. 2011;38(5):5311–9. https://doi.org/10.1016/j.eswa.2010.10.027.

[3]Guresen, E., Kayakutlu, G., & Daim, T. U. (2011). Using artificial neural network models in stock market index prediction. Expert Systems with Applications, 38(8), 10389–10397.

[4]Gupta, A.: “Stock market prediction using Hidden Markov Models”, IEEE Engineering and Systems (SCES), 2012 Students Conference on, pp.1-4, 2012.

[5]Tsibouris, G., & Zeidenberg, M. (1995). Testing the efficient markets hypothesis with gradient descent algorithms. In R A (Ed.), Neural networks in the capital markets.John Wiley and Sons.

[6]Leng, X. and Miller, H.-G.: “Input dimension reduction for load forecasting based on support vector machines”, IEEE International Conference on Electric Utility Deregulation, Restructuring and Power Technologies (DRPT2004), 2004.

[7]. Chun C, Qinghua M, Shuqiang L.: "Research on Support Vector Regression in the Stock Market Forecasting" ©Springer, Advances in Intelligent and Soft Computing Volume 148, pp 607-612, 2012.

[8]. Guo Z., Wang H., Liu Q.: "Financial time series forecasting using LPP and SVM optimized by PSO" © Springer, Soft Computing Methodologies and Applications, December 2012.

[9]Shreya Pawaskar "Stock Price Prediction using Machine Learning Algorithms", International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 10 Issue I Jan 2022. https://doi.org/10.22214/ijraset.2022.39891

[10]Ince H, Trafalis TB. Short-term forecasting with support vector machines and application to stock price prediction. Int J Gen Syst. 2008;37:677–87. https://doi.org/10.1080/03081070601068595.