

A survey on Stock Market Prediction Techniques

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ABSTRACT

Prediction is usually considered a difficult undertaking, but when it comes to stock market prediction, it gets even more difficult because it is dependent on fundamental, societal, economic, political, and many other aspects, making it unpredictable, dynamic, and nonlinear in nature. Many traders, investors, and businesses are drawn to the stock market because a solid prediction model can enhance profits while lowering the chance of loss. It has also succeeded in attracting the attention of the scientific community and researchers, encouraging them to consider it as a potential research domain. For stock market trend prediction, a few of them have successfully designed a methodology/model based on several approaches such as statistical, mathematical, Genetic Algorithm based approach, AI based approach, and so on. Artificial intelligence-based approaches such as Machine learning and Deep learning are the most commonly utilized methods in articles, research papers, and other scientific databases. As a result, the focus of this study review is Artificial Intelligence-based techniques. The majority of the research articles and papers for this review were sourced from scientific databases such as Science Direct, IEEE Access, and Scopus-indexed journals, with a few pieces from other reputable publications also being evaluated.

Keyword: - *Deep learning, Artificial intelligence, stock market.*

1. INTRODUCTION

'Stock market is not a cup of tea for common folks,' it was often said. However, thanks to technological advancements, it is now available at people's fingertips. As a result, ordinary people are becoming interested in investing in the stock market for profit, and professionals are already doing so. In addition, the scientific community, which has shown increased interest in the stock market in recent years as a result of technological advancements, is another community that has exhibited increased interest in the stock market. Initially, stock market trend prediction was unable to garner attention as a research topic, and only a few investors and corporations considered it for profit purposes. Even stock price prediction is classified as 'Random Walk States,' in which stock prices are unaffected by previous events [1]. However, the scientific community continues to attempt to predict prices and has created a variety of approaches based on diverse notions. The stock market has been described as being unexpected, dynamic, and nonlinear. In general, stock price prediction appears to be a difficult task because it is dependent on various factors that cause volatility [2]. As a result, sophisticated approaches must be implemented in order to increase profit and decrease loss. In order to track stock market movements, current trends over the last few years must be evaluated (Gandhmal and Kumar, 2019, Henrique, and Kimura, 2019) Stock market models that are accurate can provide investors with the data they need to make better data-driven decisions. Traders can use these algorithms to reduce investment risk and choose the most profitable stocks.

2. LITERATURE SURVEY

The stock market is generally thought to be complex, dynamic, volatile, and chaotic. Predicting the stock market is undoubtedly a difficult task in time-series estimation. Accurately anticipating stock movements in today's fast changing industrial environment is both exciting and tough. Trader expectations, financial situations, administrative events, and specific variables connected to market trends [3] make it even more difficult. Several non-economic and economic factors influence the behaviour of stock movements, which are also considered. Stock market models that are accurate can provide investors with the tools they need to make better data-driven decisions. These algorithms can help traders reduce investment risk and choose the most profitable companies. Stock market analysis and

forecasting, currency exchange forecasts, and optimal portfolio selection, to mention a few, are only a few of the review papers accessible on financial topics. Recent advancements in stock prediction, such as the Bayesian model, fuzzy classifier, Artificial Neural Networks (ANN), Support Vector Machine (SVM) classifier, Neural Network (NN)[3], and Machine Learning approaches, such as Deep Learning, Text Mining Techniques, and Ensemble Techniques[5,] necessitate a new assessment.

Modern models also allow for the incorporation of non-traditional data such as prior stock prices and news [5]. Technical analysis and qualitative analysis are two types of conventional methodologies for stock prediction [6]. For the future price projection of the stock, technical analysis used previous stock prices such as opening and closing prices, neighboring close values, and volume traded. The quantitative analysis was then based on external factors such as market conditions, company profiles, textual data, economic and political factors in the form of social media, new articles, and blogs [7], but today, advanced AI (Artificial Intelligence) methods based on fundamental and technical analysis are used to predict stock prices. Even while it is still difficult to predict future market trends, the majority of strategies use technical indications. For stock prediction, many approaches or models are devised for stock market trend prediction, stock price forecasting, portfolio management, and financial management. These models are based on a variety of ideas, including mathematical, statistical, and AI-based theories. As a result, the primary goal of this research is to investigate the numerous methodologies utilized for stock price prediction, as well as the datasets necessary, algorithms used, and several other techniques that are combined to provide stock price prediction models.

In general, stock data has a single memory; for example, changes in stock prices are linked to transaction data. The RNN also has excellent time-series FS (Feature Extraction) capabilities. This work [10] proposed a GRU/LSTM/RNN-based prediction model. The attention mechanism has the ability to pick and focus on important information. According to the results of the experiment, when comparing GRU, LSTM, and RNN prediction models, LSTM and GRU were much better than RNN, and GRU was also better than LSTM. In addition, the attention mechanism layer proved to be quite useful in enhancing stock forecast accuracy. Furthermore, the DNN was unable to produce satisfactory results.

Furthermore, current ANN (artificial neural network) methodologies could not produce sufficient results. Meanwhile, improvements in machine learning (ML) have yielded more promising outcomes in the field of language processing. Researchers want to use deep learning to estimate market values, according to a new study. The method has been effectively utilised in the speech sector since speech is a time series data and stock data is also a time series data. DNN was introduced as a trend prediction classifier for stock multimedia [8], and Google stock multimedia data, i.e. chart data from NASDAQ over the last 2843 days, was used as an input to forecast stock price.

Various scholars used TA (Technical Analysis) on historical-price data, which is a time-consuming operation that can potentially result in incorrect forecasts. Furthermore, combining (Machine Learning) ML with technical and fundamental analysis improves stock market prediction. Using O-LSTM (Optimal Long Short Term Memory), DL (Deep Learning), and adaptable (STIs) Stock Technical Indicators, this work [14], [15] tried to anticipate stock price trend. In addition, the study assessed this model at order to reach a buy-sell conclusion in the end. The study employed a correlation tensor created using pertinent stock technical indicators to optimize DL tasks[16].

Similarly, this study[14] employed the min-max scaling tool and attained an accuracy of almost 99 percent. The min-max scaling gave better outcomes for both prediction and recognition, according to the research. Despite the fact that outliers are sensitive to min-max scaling, the study failed to notice them in the comparison analysis.

3. ANALYSIS

This section is dedicated to the examination of several stock market trend forecast approaches. After reading the study papers, look for keywords like "stock market," "stock market prediction," "stock market forecasting," "finance forecasting," And "stock market trend prediction." Some of the articles are given in table 1 from diverse publications such as Elsevier's Science Direct, IEEE Access, Springer, and other reputable Scopus indexed journals. There are several strategies based on diverse methodologies that have been discovered. Many characteristics, including as the input dataset, the outcomes generated, the parameters employed, the data pretreatment methods used, the methodology used, the instruments used for assessment, and the stock exchanges used, may be used to classify these strategies. To forecast future stock prices, mathematicians employ statistical methodologies. In fuzzy based models, historical data and hypotheses such as normality postulates are included. Traditional time series are used in several stock market prediction methods, including fuzzy time series data, real numbers, and fuzzy set design. Fuzzy time

series data is utilized to manage linguistic value data and achieve correct predicting outcomes in stock market prediction.

In dynamic contexts like tourism demand and financial markets, these strategies are often employed to predict nonlinear and dynamic information. Genetic Algorithms were one of the solutions proposed by a few scientists in the scientific community. A genetic classifier can be used to control the activation of a feed forward artificial neural network in order to do locally scoped forecasting. Genetic and neurological components are given different information: The former uses inputs that encapsulate technical analysis information, whilst the latter uses other pertinent inputs such as previous stock prices [17]. Some experts believe that soft computing methods can be used to predict stock market trends. For example, a few researchers have combined generic fuzzy systems with ANN to predict stock price, where all clusters are fed into independent GFS models with the ability to extract rule bases and tune databases [18].

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