STOCK PRICE PREDICTION USING MACHINE LEARNING TECHNIQUES

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Objectives and Motivations:

Stock price prediction of the current market significantly influences any country's economic conditions. That is why a stock market prediction is necessary for evaluating the upcoming economy. Stock market price can be varied due to several factors such as emotions, public sentiments, positive or negative publicity of any particular products, and so on. The investors may decide whether they will invest or how much amount they will invest in their business products. The governments also take it their consideration before providing various incentives to any exporters. The stock market prices are usually predicted by analyzing historical data, real-time data, and particular news on products.

The main objective of the research is to predict stock market prices by analyzing some factors.

Proposed Methodologies:

Both Real-time data and historical data are needed to predict stock market prices accurately. The news has also an impact on stock prices as it reflects people's perceptions. That news of different products was collected from various websites. Their gathered data were stored in a database in XML format. There were many abusive words, symbols, inconveniences in a summary of their collected information which was provided as inputs to predict stock prices by analyzing those data. They also had accurate feedback when a dictionary-based approach was followed. The total score was calculated by analyzing scores of every single word in each sentence. The calculator was utilized to evaluate the scores after matching positive and negative perceptions. The final comparative prediction was represented in positive, negative, and neutral indicators in graphs or diagrams.

Contributions:

LSTM model was utilized for predicting the stock price. It means Long short term memory network and it is one kind of special neural network. The model made by the neural network can understand the present frame after analyzing the previous frame. A rational group of every Business details of the stock market of a fixed time was identified in their used LSTM model. Every single detail of stock prices was indicated with showing Up and down, open and close, rising, and declining attributes. The percentage of income was calculated by evaluating the last three successive business sessions on the last day. This model can store both big and small sizes of data. There were two layers named input and output layers. Input data were given in a vector

form and it provides essential feedback through analysis. The feedback of prediction must be for a specific period.

Lackings of the Research:

This is a very difficult task to measure accurately what will be the stock market performance in the future as there are many factors behind the ups and downs of stock market prices. These factors can be physical or psychological, logical or illogical, etc. All these things should be considered before predicting the prices. There are various researches on this topic like this research where only the LSTM model was explored to improve the accuracy levels. However, they could start this task with linear regression and then turned into both LSTM and auto ARIMA or any advanced ways. This is how they could improve their innovation quality.

How This Research Will Help Me:

Predicting the future value of a stock is the main goal of stock price prediction project. This paper proposed an approach that uses machine learning algorithms and will be trained on the historical stock data that is available and gain intelligence, later it uses the knowledge acquired for predicting the stock prices accurately. So, this research will help me to select an appropriate machine learning algorithm using artificial intelligence for doing my project.

Reference:

[1] M. Vijh, D. Chandola, V. A. Tikkiwal, and A. Kumar, "Stock Closing Price Prediction using Machine Learning Techniques," *Procedia Comput. Sci.*, vol. 167, no. Iciss, pp. 599–606, 2020, doi: 10.1016/j.procs.2020.03.326.

Machine Learning Stock Market Prediction Studies: Review and Research Directions

https://scholarworks.lib.csusb.edu/jitim/vol28/iss4/3/

Objectives and Motivations:

Stock market prediction is the act of trying to determine the future value of a stock. And this prediction is used for comparison with the company's market value and finding out whether the company is undervalued on the stock market or not. The objective of this study is to identify directions for future machine learning stock market prediction research based upon a review of current literature. This will provide artificial intelligence and finance researchers with directions for future research into the use of ML techniques to predict stock market index values and trends.

The motivation of this research is to uncover a model that can consistently predict the direction of the future stock prices that would make the owner of the model very wealthy. Thus, researchers, investors, and investment professionals are always attempting to find a stock market model that would yield them higher returns than their counterparts.

Proposed Methodologies:

The authors looked at four dimensions for each system: machine learning technique, model estimation accuracy, model components, and estimation context. This present study utilizes a methodology that is similar to the ones described above because it is also evaluating articles describing ML used for predictions in a highly complex problem domain. In this methodology, relevant articles are selected through a systematic search process and studies using similar ML methods are grouped together. A research framework (taxonomy) is then provided to encompass each of the study categories and provide a description of how the categories differ. The studies in each taxonomy category are then assessed to identify common and unique findings within the set of studies. This provides the basis for making researcher recommendations. The remainder of the paper is organized in the following sections. First, the process used to identify relevant studies is described. Next, based on an assessment of the studies identified, a research framework (taxonomy) is presented that groups the studies based on the ML technique used to predict stock market index values and trends. The studies in each category are then individually summarized and discussed to identify common findings, unique findings, limitations, and areas where more study is needed.

Each researcher then reviewed each paper to identify groups of related studies that used a single machine learning technique, or those that used a hybrid or multi-method approach. Each of the articles fits into one of the following four categories:

(1) Artificial Neural network studies

(2) Support Vector Machine studies

(3) studies using Genetic Algorithms with other techniques, and

(4) studies using Hybrid or other Artificial Intelligence approaches.

Contributions:

The first set of articles includes studies that primarily focus on stock market prediction using artificial neural networks (ANNs). Neural network models for level estimation and classification are examined for their ability to provide an effective forecast of future values. A cross-validation technique is also employed to improve the generalizability of several models. The researchers provide an objective assessment of both the advantages and drawbacks of deep learning algorithms for stock market analysis and prediction. Using high-frequency intraday stock returns as input data, they examine the effects of three unsupervised feature extraction methods—principal component analysis, autoencoder, and the restricted Boltzmann machine—on the network's overall ability to predict future market behavior.

SVMs offer an alternative method to ANNs for improving stock market prediction accuracy through example categorization. To evaluate the prediction accuracy of this SVM-based model combined with F_SSFS, performance is compared with a backpropagation neural network (BPNN) along with three commonly used feature selection methods: information gain, symmetrical uncertainty, and correlation-based feature selection via paired t-tests.

One alternative machine learning method that has the potential to do this is incorporating genetic algorithms (GAs) with either ANNs or SVMs to reduce single technique limitations. This study proposes an approach that is capable of incorporating the subjective problem-solving knowledge of humans into the results of quantitative models. The study utilizes two unique networks: adaptive time delay neural networks (ATNNs) and time delay neural networks (TDNNs). A GA is incorporated into the models to support optimization of the number of time delays and network architectural factors simultaneously for the ATNN and TDNN models.

The final category describes studies that have used other unique, or multi-method, artificial intelligence techniques in the problem domain. Rule-based expert systems have been used for decades to provide domain-specific knowledge to novice decision-makers. The expert system includes patterns and rules which can predict future stock price movements. Defined patterns are classified into five forms of price movements: falling, rising, neutral, trend continuation, and trend-reversal patterns. According to the efficient market hypothesis, stock prices should follow a random walk pattern meaning that the market should not be predictable with more than about 50 percent accuracy. The approaches of stock price prediction include linear discriminant analysis (LDA), quadratic discriminant analysis (QDA), K-nearest neighbor classification, naïve Bayes based on kernel estimation, logit model, tree-based classification, neural network, Bayesian classification with Gaussian process, support vector machine, and least squares support vector machine (LS-SVM).

Lackings of the Research:

In this paper, the researchers or authors discussed only about Artificial Intelligence techniques like ANN, SVM, GA & Neuro-fuzzy models. But they didn't discuss about another approach which is Auto-Regressive Moving Average Modelling . Auto-Regressive Moving Average (ARMA) model is a Box-Jenkins model that combines Auto-Regression (AR) and Moving Average (MA). AR model is simply a linear regression of the current value of a time series against one or more prior values of the series. MA model is a linear regression of the current value of the series against the white noise or random shocks of one or more prior values of a time series. So, I think this is one flaw of this research paper.

How This Research Will Help Me:

The processes that discussed in this are successful in predicting the futures stock prices with a good accuracy rate depending on the various attributes given by the user in the collected data set, thereby eliminating the human error as the decision process is successfully automated. This research will help me to choose the best machine learning algorithm for my project.

Reference:

[1] T. J. Strader, "Machine Learning Stock Market Prediction Studies : Review and Research Directions Machine Learning Stock Market Prediction Studies : Review and Research Directions," vol. 28, no. 4, 2020.