Stock Market Prediction and Recommendation

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Abstract- **Stock Market becomes an extremely and fundamentally a very important instrument for any country as it plays a very big role in financial movement. Investors are attracted towards the stock market as it helps gain a high yield and companies enter the stock market to have a cash flow for everyday activities and expansion of business. But, investing in the stock market is not any easy task as it requires detailed analysis and research study. Hence, this paper proposes a system which will help investors in making an investment decision. This paper proposes a system which will use machine learning techniques to predict the future price of the stock. Further, social media sentiment analysis is done to know the actual market mood and implement a recommendation system which helps in suggesting whether to buy, sell or hold the stock.**

Keywords: Prediction, Sentimental Analysis, Machine Learning, Social Media, Investing, Recommendation.

INTRODUCTION

A stock market is a collection of buyers and sellers of stocks. These stocks represent ownership interests in companies. These may include publicly or privately traded securities. The National Stock Exchange (NSE) is an example of a share market. Usually, large companies will list their stock on a stock exchange because it makes their shares more liquid (i.e., easy to buy and sell), which investors love. This liquidity also attracts international investors [1].

Trading in shares is big business in many economies including NSE/BSE. Currently, Stockbrokers who execute trades and advise clients, rely on their experience, technical analysis (price trends) or fundamental analysis (buy and hold) in picking their stocks. These current methods are subjective and are usually short sighted due to their limited capacity. With the value of trade money involved, improper investment could easily mean great losses to investors, especially if they keep making wrong decisions. Lack of guaranteed returns has also led to the reluctance by potential investors to participate in the market. It is therefore desirable to have a tool that can guide on the most likely next day prices (prediction) as a basis for making any investment decision. The uses of fundamental and technical analysis methods are the basis of the predictions of future stock price movement. These tools show a trend on future movement and not the figure of the most likely trade price for any stock in future. It is therefore desirable to have a tool that does not just point at a direction of price movement. Machine Learning methods that can actually analyze the stock prices over time and gain intelligence, then use this intelligence in prediction, can be used to model such a tool [2].

LITERATURE REVIEW

Few of the following papers were considered for reviewing and proposing the system of stock market prediction and recommendation system. Table 1 shows the literature survey done for the proposed work.

Table 1. Literature Survey

Sr. No	Paper Name	Year of Publication	Author	Publication	Proposed work	Research Gap

1	Stock Market Prediction Using an Improved Training Algorithm of Neural Network	2016	Mustain Billah, Sajjad Waheed, Abu Hanifa(3)	IEEE	Predict the possible day-end closing stock price with less memory and time needed	Sentimental Analysis
2	Mobile App for Stock Prediction Using Improved Multiple Linear Regression	2017	Abidatul Izzah, Yuita Arum Sari, Ratna Widyastuti, Toga Aldila Cinderamata (4)	IEEE	Android platform for stock price prediction using IMLR (Multiple Linear Regression)	Only Moving Average technique was used giving unsatisfactory result
3	Developing a Prediction Model for Stock Analysis	2017	R. Yamini Nivetha, Dr. C. Dhaya (7)	IEEE	Monthly prediction and daily prediction to forecast the next day market price using sentimental analysis	Unable to achieve high level accuracy .
4	Stock Prediction and Analysis Using Intermittent Training Data With ANN	2017	N.Srinivasan,C.Lakshmi (8)	IEEE	Intermittently send training data thus get appropriate stock values and accurate forecasting	Huge amount of data,memory,time ,processor required

PROPOSED SYSTEM

Stock Market is a volatile market where investors try to make money out of it. To help investors earn money, we propose a prediction system which can help investors to make profits. Prediction system is based on a Machine Learning algorithm which helps in predicting the future. Twitter plays an important role in deciding the sentiments of the market. Hence, we have also implemented a sentimental analysis system. In our proposed system, for predicting the stock prices of companies listed in NSE, a dataset is passed through the SVM RBF machine learning algorithm. The data is collected from yahoo finance for the past 1 year. Dataset consists of date, open, close, high, low, number of shares traded or volume. Observations from a literature survey provided results that some algorithms gave slightly higher or lower predicted prices than the actual price.

Figure 1 shows the stock market prediction using SVM Classifier. A user will be shown tweets related to renowned financial bodies who have a big influence on the stock market. The sentimental analysis module will calculate the polarity of the words and show the user if it is a good idea to either buy some stock, holding the stock or selling the stock

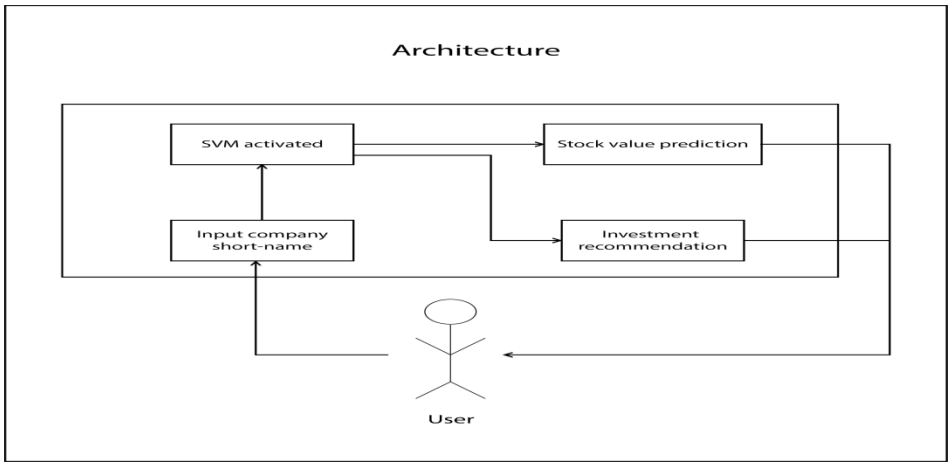

Figure 1. System Architecture

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SVM involves classification of data points into two or multiple classes by separating them with a hyperplane. It can be used as a classifier to determine whether the next stock value will be positive or negative. If it is predicted to be positive, it gets a +1 rating, and a -1 rating otherwise. The goal of this system is to recommend the users what company they could invest their money at. Apart from the SVM engine, the sentimental analysis engine rates each and every tweet found of the given company, and thereby determines an overall final recommendation to the user if it is a good idea to invest in the company or not. A comparison helps the users in determining if they trust words more or statistical data. The current system architecture involves prediction through an SVM engine where users only need to input short names of the company listed in NSE, and hit search. On search, the algorithm starts running, and the user gets to preview a graph of the historical and predicted value of the stock of the entered company. Along with a numerical prediction, the application also suggests the user if it's a good or bad idea to currently invest in this particular company. Fundamental model of the project gives an overall idea about the project. How the entities are related to each other, what are the attributes of the entities and how the data flows between the entities is shown by the fundamental model.

Figure 2 shows the workflow model for recommendation. For the sentimental analysis module, a TextBlob module has been utilized. Initially, a set of selected words have been trained to determine if they are positive or negative. If a tweet containing majority positive words is found, the whole tweet is treated as a positive tweet, and vice versa for a negative tweet. The main motivation behind the sentimental analysis module is so that users are able to believe that multiple people are talking positively or negatively about a company which helps even a layman understand if they should be investing or not. The data set used in the current model is taken from the Yahoo! Finance stock market API which contains data of all the companies listed on the National Stock Exchange(NSE).

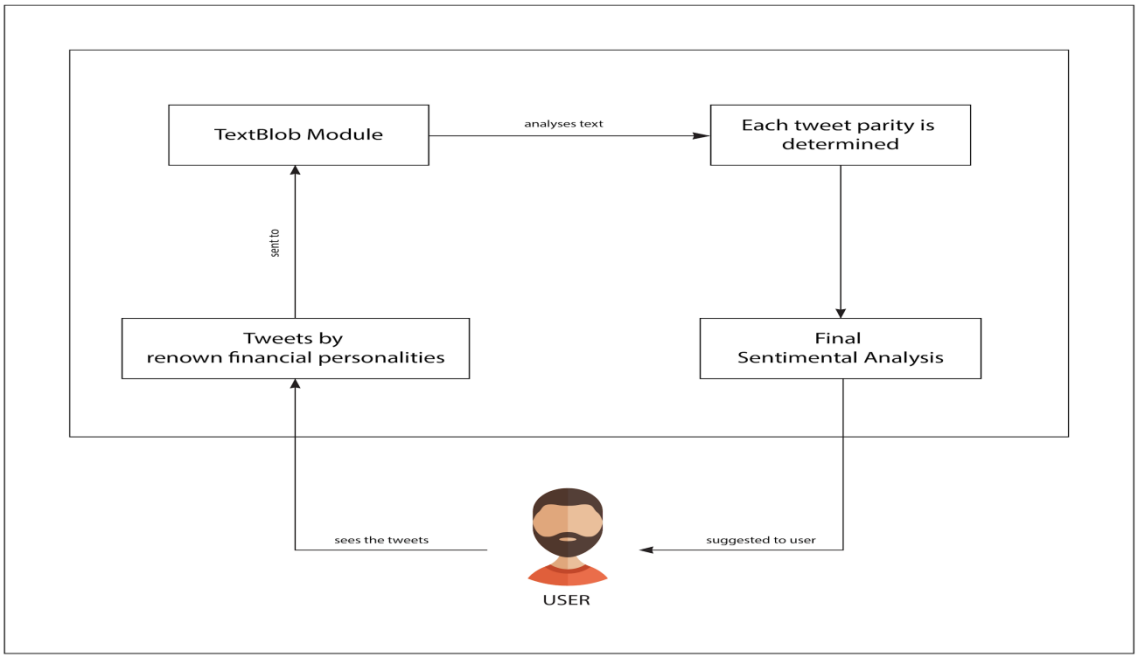

Figure 2. Workflow Model

RESULTS AND DISCUSSION

This section includes snapshots of the actual outputs that were seen by the user and this chapter also contains the results of the proposed system. Figure 3 shows the initial home screen which is displayed to the user and it contains a search bar where, a user can enter the name or company code (ex. AAPL for Apple company)

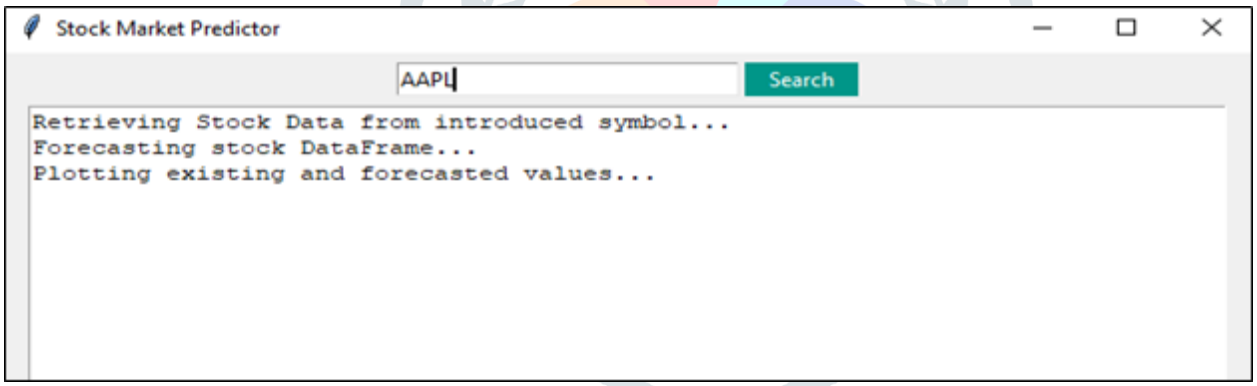

Figure 3. Home screen of the system.

The data set used is from the month of February of a company. A sample data set is shown in figure 4 as follows:

	Date	Open	High	Low	Close	Adj Close	Volume
0	2019-06-03	1065.500000	1065.500000	1025.000000	1036.229980	1036.229980	5130600
1	2019-06-04	1042.900024	1056.050049	1033.689941	1053.050049	1053.050049	2833500
2	2019-06-05	1051.540039	1053.550049	1030.489990	1042.219971	1042.219971	2168400
3	2019-06-06	1044.989990	1047.489990	1033.699951	1044.339966	1044.339966	1703200
4	2019-06-07	1050.630005	1070.920044	1048.400024	1066.040039	1066.040039	1802400
5	2019-06-10	1072.979980	1092.660034	1072.322021	1080.380005	1080.380005	1464200
6	2019-06-11	1093.979980	1101.989990	1077.603027	1078.719971	1078.719971	1436700

Figure 4. Sample Dataset and SVR RBF Result

Figure 5 shows the sample dataset of tweets collected from twitter users and converted to data frames which is to be analyzed. A total of 100 tweets per renowned financial advisor is taken for sentimental analysis, and the following result is obtained.

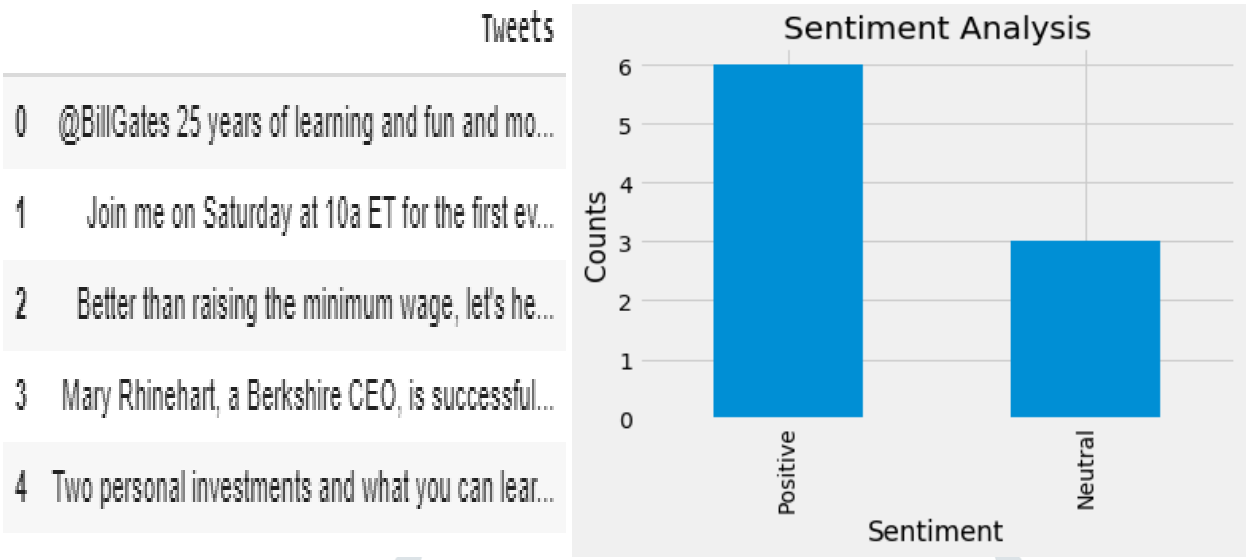

Figure 5. Tweets Data Set and Sentimental Analysis for Tweets

CONCLUSION

The stock market is a big stage for financial exchanges to take place in, where all kinds of unexpected things keep arising, eventually affecting the daily stock values of all the companies. For example, a sudden natural disaster which cannot be predicted by a simple machine could occur, throwing all the calculations off the board and resulting in a bad fit of the previous data. Such things are beyond the scope of simple machine learning algorithms and only current affairs, as talked about financial bodies can help in people deciding whether they should hold, buy or sell their stocks. Our proposed system makes study for stocks listed in the National Stock Exchange (NSE) using SVR RBF algorithm. The system aims to maximize the profit of investors using the prediction module. Prediction is powered by a recommendation system which makes use of sentimental analysis of the market and gets the views of investors and market conditions which help in deciding the market movement. Twitter proves as a good source to get the overall view of the market which helps investors in deciding whether to buy, hold or sell the particular company shares
The work can be further advanced by using algorithms that fit a company's data in a way that better predicts the future data. A particular algorithm that has a best fit would have a higher weight during the calculation while an algorithm with a lower fit would have a lesser weight to its predictions.

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