International Journal of Contemporary Research in Computer Science and Technology (IJCRCST) ISSN: 2395-5325
Volume 3, Special Issue 2 (March '2017)
Proceeding of - National Conference on Recent Trends in Information Technology and Communication,
Conference held at Velammal Engineering College,Chennai,India.

STOCK PREDICTION USING ARTIFICIAL NEURAL NETWORKS AND SENTIMENTAL ANALYSIS

Dhanalakshmi.S,
UG Scholars,
Department of Computer Science and Engineering
Velammal Engineering College,
Chennai, India.

Sruthi.R,
UG Scholars,
Department of Computer Science and Engineering
Velammal Engineering College,
Chennai, India.

Pavithra.B,
UG Scholars,
Department of Computer Science and Engineering
Velammal Engineering College,
Chennai, India.

Dr.Anitha Julian,
Assistant Professor,
Department of Computer Science and Engineering
Velammal Engineering College,
Chennai, India.

Abstract: The stock market is one of the sectors where technology and advancement in technologies have not been utilized to the fullest potential. Prediction of financial market index values has been a topic for researchers from the financial domain for more than a decade. The stock market forecast is presented in the form of trend through graphs that show future stock price movements with reference from beneficiaries like trades, investors, etc... This paper proposes Artificial Neural Network based Sentimental Analysis that provides an accurate prediction of the stock market. It combines many details of the individual through a user friendly system at the customer level.

Keywords: Stocks Market; forecast; Prediction; Artificial Neural Network; Sentimental Analysis

I.INTRODUCTION

Predicting stock market return is a central issue in the field of finance, engineering, mathematics, economy and science. Due to its probable finance gains, stock market prediction has been a goal of investors since its existence. An accurate forecast of the trends of the stock index can help investors to acquire opportunities for gaining profit in the stock exchange. Despite its prevalence, Stock Market prediction remains a secretive and empirical art. Every day billions of dollars are traded on the exchange, and behind each dollar is an investor hoping to profit in one way or another. Entire companies rise and fall daily based on the behavior of the market. Should an investor be able to accurately predict market movements, it offers tantalizing promises of wealth and influence. It is no wonder then that the Stock Market and its associated challenges find their way into the public imagination every time it misbehaves.

Artificial Neural Network (ANN) is a mathematical replica that imitates human mind acquiring and decision-making procedures. Neural networks are the interrelation of non-natural neurons running in a manner to interpret a particular difficulty. Studies done previously have applied various models in predicting the direction of the stock market index movement. ANN application has become the most popular machine learning method, and it has been proven that such an approach can outperform most conventional methods. A three layered neural network has been proved to be a universal function approximator and finds its use in many fields like price forecasting, sales forecasting, data validation, customer research medicine etc. This work attempts to apply an ANN model to forecast the direction of the stock market index and also use classical learning algorithm, Back Propagation (BP) which is widely applied for neural networks and used for training the ANN model. Genetic algorithm (GA) is employed to improve the prediction accuracy of the ANN model and overcome the convergence problem of the BP algorithm [1].

Sentimental Analysis is a widely used field that is beneficial to every industry. Sentimental Analysis is also known as Opinion Mining is an area that uses Natural Language Processing and Text Analysis that help in building a system that identifies and extracts information in the source material. Sentimental Analysis provides the ability to extract insight from social data which is broadly used by various organizations across the world [5].It focuses on the understanding of the emotions or opinions from the text patterns. It identifies the attitude that a person has towards an object or a topic and it tries to identify the viewpoint underlying a text span.

Sentiment analysis is useful in most social media monitoring to automatically characterize the feeling or mood of consumers towards a specific brand or company. It determines whether they are viewed positively or negatively. In the proposed work, to improve the performance of feature selection, genetic algorithm that incorporates various machine learning algorithms have been used. This proposed approach combines the Natural Language Processing (NLP) and fuzzy classification to improve the accuracy of sentiment prediction and reduce the space and time complexity.
The rest of the paper is organized as follows. In the second section, previous related works are discussed and their views have been briefed. In the third section, the methodology for the proposed work has been explained. The next section illustrates

the proposed solution, the algorithms used, diagrammatic representation and the implementation tools being used. The sixth section discuss conclusion and future work.

II.LITERATURE REVIEW

Stock prediction has been under research over the past decades

The authors of [1] have applied two types of techniques to predict the next day movement of particular product and they have also used GA algorithm and tested by GA-ANN hybrid model and the type 2 model gives accuracy of 86.3%.

The authors of [2] suggest a Neural Network model has been used in predicting the stock market. One of the methods used in data mining is Artificial Neural Network (ANN), in this paper author used NASDAQ stock market using ANN with given parameter of share market. Feed forward method also been used and the system is trained with the input data stock market price in between 2012-2013.

Stock market is a perfect financial investment where one can find more profit. Developers have used lots of method in computer science and economic to attain and to get a piece of this volatile information and to get a big profit out of stock market investment. The paper [3] provides a review about the application of ANN in stock market prediction in order to determine the future process.

Sentiment analysis deal with classifying opinion about the source text. The user normally gives the comment through any social media out of which Twitter sentiment analysis is the most difficult. Sentimental Analysis is done in three phases. In first phase preprocessing is done. A feature vector is created using relevant features. Finally using different classifiers, tweets are classified into positive and negative classes. Based on the number of tweets in each class, the final sentiment is derived in this paper [4] they try to analysis twitter post about electronic products like cellphone, personal computer, laptop, etc. Using machine language, they present new feature vector for classifying tweet as positive, negative and extract people opinion about product.

The authors of [5] represent a predictive model that displays the trends of stock price using data mining techniques. The past price for a week or so has been calculated. The results of the analysis is improved through ANN classification. The maximum accuracy of the model is 93.89% and to better the solution Greedy algorithm through forward selection has been used. National wide stock market is the most invested dealings nowadays and has become the capital expenditure medium for both planned investors as well as common man. ANN can identify new samples even if they have not been in training set, this is supposed to generalize the ability of neural network. ANN belonging to AI for the growth of efficient marketing policies and it is necessary to forecast the direction of exchange, this paper [6] has feed forward network, neural network and back propagation algorithm that enable to decrease the output and expected output in agrarian descent method.

The authors of [7] suggest that the media can be portrayed as a developed financial market through business and the fastest growing exchange of their thoughts. The authors say that machine learning and sentiment analysis can be a great help to lead the mood and psychology of users which affect the stock market and thus can help the research to predict actual statistics. In this work the sentiment analysis was formulated on data from media and it is classified by classification algorithm and the comments are classified into few parameters. The comments from the user are used as the input for ANN to be trained for data of n days and the changes in index values on each day. This trained network is further used to predict the stock exchange index values for the future days.

III.METHODOLODY

An artificial neural network is a structure which is similar to a human brain. It contains a highly interrelated structure of neurons. These neurons act as an input which activates the system [5]. ANN is a computational model which is based on the structure and functions of a biological neural network. Information that is supplied to a network affects it as it changes or learns with that information. Thus an artificial neural network is mostly preferred by the researchers to use in problems which involves computational tasks, analysis, finding similarities and much more. The architecture of the ANN is shown in Figure. 1.

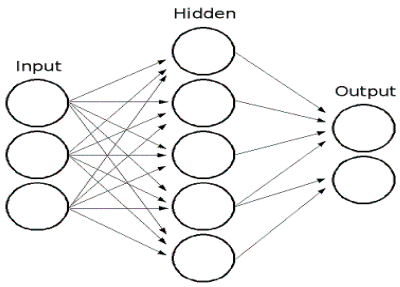

Figure 1. Artificial Neural Network

The number of the input layer is decided by the number of input features in each pattern, and the number of output layer neurons is decided by the number of output features in the target values. The back propagation algorithm comes into the general category of gradient descent algorithms, which plan to find the minima or maxima of a function that is by repeatedly moving in the direction of the negative of the slope of the function to be minimized or maximized. The various parameters to be varied by the user were systematically varied one by one to get the ideal set of parameters so as to obtain the maximum efficiency in the data prediction. Data used in the proposed research work was primarily collected from stock dedicated website i.e. Stock Wiz. Historical data were mined from Stock Wiz on which artificial neural network was used to train the data. The implementation process was performed in DOTNET as it delivers the best validation result to show the error and the least value of epochs which will give best results.

IV.PROPOSED WORK

Nowadays monitoring social trends have been always proven to be helpful in detecting user's point of view towards a particular company or a brand. Financial domain research

shows that social media and user comments can affect the share market. Both the informational and news aspects can impact the stock price and even future company earnings. The input data is further classified on the basis of polarity indexes used in our work which is good, bad and average and rejected to compute the overall index of the sentiments and to determine whether the sentiments are positive, negative or neutral towards a specific company. The overall index values and the market data of that company became the inputs which are passed to an artificial neural network to train and predict. The entire data is passed to a neural network to train and predict the closing value of stock price for a company.In this proposed system, the prediction is based on news articles using one of the Text Mining concepts like sentiment analysis, which is one of the most popular techniques which is widely been used. Extraction of sentiments from user's comments is used in detecting the user view for a particular company. Sentimental Analysis can help in predicting the mood of people which affects the stock prices and thus can help in the prediction of actual prices.

A. Algorithms Used

A genetic algorithm is an optimized feature selection algorithm and also a search which integrates with whole methods to improve the performance and overcome the limitations of the traditional method. An optimization is a process of discovering the best or an optimal solution for a sentiment classification. Genetic algorithms are a specific class of evolutionary computation that uses many techniques inspired by evolutionary biology such as mutation, selection, inheritance, and crossover. The implementation of a genetic algorithm begins with the selection of a population of entities that is a set of solutions to problems that could occur for a particular scenario. The proposed work has taken taken three parameters which are good, bad and average. The output prediction parameter is calculated through the daily return of investment method.

B. Diagrammatic View

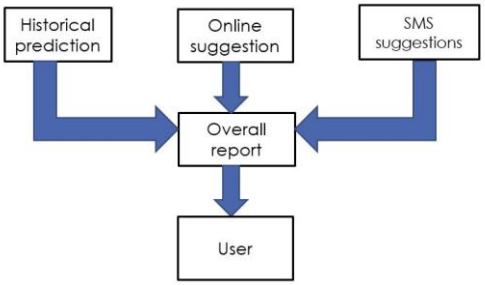

Figure 2. Modules in the proposed system

As shown in Figure 2 the modules identified are as follows:

a). Historical prediction using ANN
b). Collecting Suggestions from online and SMS
c). Visualization of overall reports

C. Historical prediction using ANN

ANN application has become the most popular machine learning method, and it has been proven that such an approach can outperform most conventional methods. The data is collected from stock dedicated website i.e. Stock Wiz, which has been trained by ANN and produces result that show whether the customer can buy or sell the stock depending on the result.

D. Collecting Suggestions from online and SMS

The first step is to collect messages from the customers on particular stock information through customer login. A database for the collected messages is maintained. The database contains a number of messages received from the customers. The spell checker that is present corrects the spelling mistakes in each document. Suggestions from the dictionary are also given. The grammar sentences in each document can also be corrected if need be. It prompts the correct sentence options for altering. It removes the stop-words like to, a, an, not, the, etc. It eases the analyzing procedure in sentiment analysis module. It is a process of mapping of all the alternatives to the ROOT word. It identifies the tense of the word. For example, the root word "go" has the following variations – go, went, gone. The system analyzes every message in the group individually using sentimental analysis. It gives each person feedback as good or bad or average in a graph.

E. Visualization of overall reports:

Figure 3 and Figure 4 displays the result obtained by both historical prediction using ANN and collecting suggestions from online using SMS.

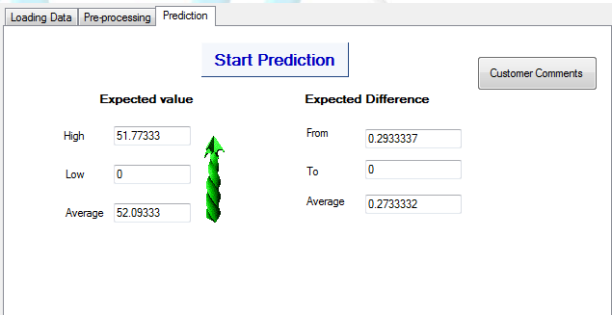

Figure 3.Historical prediction using ANN

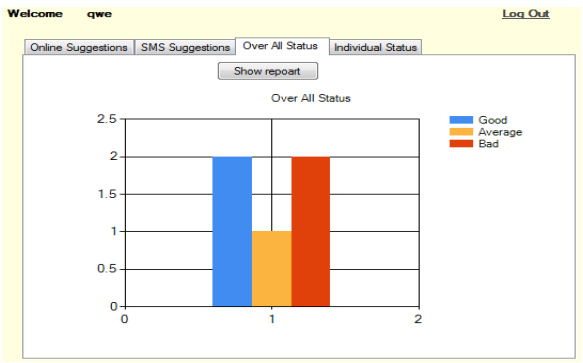

Figure 4.Collecting suggestions from online and SMS

V.CONCLUSION

Predicting stock market is a really hard to crack and requires lot of effort. The proposed work provides a review of Artificial Neural Network and sentimental analysis. ANN is shown to be the best method for accuracy on a stock market analysis or prediction. The set of data is given to the ANN to predict whether the stock should buy or sell to get a profit to a company. The sentimental analysis enables the user to analyze the nature of a specific product based on the comments collected for that product. The customer decides to buy or sell the stock based on this analysis. It has been ensured that the error rate while performing all implementations is reduced to the least. The sentimental score of the stock is analyzed and that with maximum profit or whose score is likely to increase in the near future is chosen for investment. The work can further be enhanced in future to take up data and comments from larger number of sources to be analyzed.

VI.REFERENCES

[1]. Qiu Mingyue; Li Cheng; Song Yu, "Application of the Artificial Neural Network in predicting the direction of Stock Market Index", 10th International Conference on Complex,Intelligent, and Software Intensive Systems(CISIS), 2016.
[2]. Yunus Yetis,Halid Kaplan,Mo Jamshidi, "Stock market prediction by using Artificial Neural Network" ,World Automation Congress(WAC),Pages 718-722, 2014.
[3]. Chang Sim Vui, Gan Kim Soon, Chin Kim On,Rayner Alfred and Patricia Anthony, "A
[4]. Review of Stock Market Prediction with Artificial Neural Network (ANN)",IEEE International Conference on Control System, Computing and Engineering, 29 Nov. - 1 Dec. 2013.
[5]. MS Neethu, R. Rajasree, "Sentiment analysis in twitter using machine learning techniques",Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT), Pages: 1 – 5, 2013.
[6]. Weerachart Leotyingyod ,Nunnapus Benjamin , "Stock Price Trend Prediction using Artificial Neural Network Techniques",International Computer Science and Engineering Conference (ICSEC), Pages: 1 – 6, 2016.
[7]. Neelima Budhani, C.K. Jha, Sandeep K. Budhani, "Prediction of stock market using artificial neural network", International Conference Techniques for Engineering Technology (ICSTET), Pages:1-8, 2014.
[8]. Sunil Kumar Khatri,Himanshu Singhal, Prashant Johri, "Sentimental Analysis to predict stock exchange using Artificial neural network", Proceedings of 3rd International Conference on Reliability, Infocom, Telecommunication and Optimization, Pages: 1-5, 2014.

