IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 1, January 2017

Prediction of Stock Market Price using Neural Network

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Abstract: In the modern Digital time, Data Mining is the powerful area for analyze the large data sets to get unexpected results. Text mining is the application of data mining techniques which are used to extract knowledge from Text documents. Interest in Text mining has grown in very short time. In this paper our approach is to extract structured text from unstructured text and predict stock prices using neural network. It also explains how text mining plays an important role by getting large set of contents and uses those contents in decision making which will be useful in particular environment like business, education and research. In stock market prediction we will predict all upcoming ups and down in stock market. We will predict stock market prices and also check the parameters due to which stock prices can be increase or decrease like Political Parties, Economic Effects, Increasing demands etc. In stock market prediction we make a hypothesis for getting desired results. We will also design some useful parameters to optimize our system which will obtain good predictive performance.

Keywords: Text Mining, Time Series analysis, Stock market prediction, Support Vector Machine, Accuracy, Remove noisy data.

1. INTRODUCTION

Data mining is a main area in computer science in which one can able to extract the information from the large datasets to make that information to useful for future use. Text mining is a sub category of data mining.**[1]**

Text mining has now great attention in the information industry and in society due to the existence of large amounts of data and the crucial need for changing this type of data into information and knowledge which is useful**.[2]**

This paper will discuss use of text mining process to help out the stock market prediction using neural network and data mining techniques. Data classification methods are used to categorize data in useful form.**[3]**

Using prediction we can predict future stock prices that they will increase or decrease. If successful prediction of stock then it will be beneficial for future and with stock market prediction profit will also increase. Now a day data for stock market prediction is limited so data from social media, news will collect to analyze current trends of stock market.

The great interest noticed in the industrial area all over the world is due to share market and stocks ups and downs. It is not only in big companies and investors but small companies, individuals, entrepreneurs, salaried people, people having fixed income group are also nowadays interested in the purchase and sale of shares. They purchase shares when the prices are low in the market and sold when they are high. When share prices will arise, this will be profit for investors.

2. LITERATURE SURVEY

Text mining is a multidisciplinary field which is involved in information retrieval, text analysis, information extraction, clustering, categorization, visualization, database technology, machine learning and data mining. So after review of different papers text mining is a new research area in which knowledge will extract from unstructured text. It means needed text / information will extract using text mining. In it we extract information from different written resources.

Thus text mining method can be used on various fields like social media, news etc. Thus after read different papers we find a problem in stock market prediction.

So stock market prediction is a vast area of research where we can apply text mining techniques for retrieve the text and also use SVM for retrieve numerical data sets and text data. After prediction of stock prices we get collection of data sets which is unstructured.

Thus we have to make unstructured data into structured data and remove noisy data from data sets. Noisy data can be missing value, duplicated data, etc. Removing of noisy data is also called outlier detection which use different mining methods for detection of noise and then remove it.

For example if we have to predict data of Indian stock market. Firstly we have to mine the text and numeric data then predict it. After prediction we will get a data set then remove duplicated data from predicted data set.

This technique will beneficial for business and stock market prediction will also increase profit of market.

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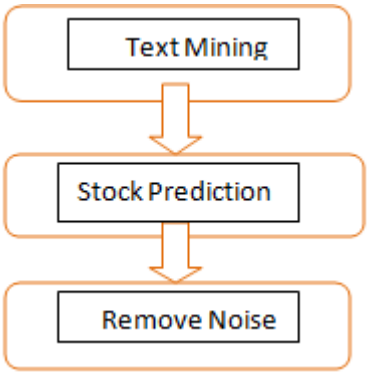

Figure. Literature Review process

STOCK PREDICTION USING NEURAL NETWORK

Neural Network is a pattern of information processing that is inspired by the nervous systems, such as human brain, process information. It is the structure of the information processing system. It is collection of a large number of interconnected processing elements like neurons working in unison (identity of pitch) to solve specific problems. Neural Network is like human-being which learn from examples. Neural network is used for a specific application, such as pattern recognition or data classification, information extraction through a learning process. Neural networks, with their good ability to derive meaning from complicated or large data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. Now days during increasingly developed technology of the World Wide Web and Internet, the data is becoming extremely rich. With the application of data recognition process, the information extracted from data has become the most important part in some areas of society, management field, finance and markets, etc. It is necessary to develop the valid method to understand the knowledge of the data. Neural networks have become very important method for stock market predictions because it deals with uncertainty, fuzzy and insufficient data which fall and rise irregularly in small or short time. Number of applications of neural network are used in solving business problems has proven their advantage in relation to classical methods that do not include artificial intelligence. The most frequent areas of neural networks applications in past 10 years are production/operations and finance. Neural networks in finance have their most frequent applications in stock performance and stock selection predictions

Stock Market Prediction- The day-to-day business of the stock market is very complicated. Many factors are there for checking whether a given stock will go up or down on any given day. Since neural networks can examine a lot of information quickly and sort it all out, by predicting stock prices. **[4]**Stock price is the price at which the last transaction took place. For example if we are looking at stock price of Reliance at 9:45:00 am and the last transaction was purchase/sell of 1000 shares by an investor at Rs. 899.50 then 899.50 will be the stock price that will be reported by exchange.

Our opinion is to focus on following work for stock prediction.

1. Firstly use Text Categorization method to predict the trend of the stock. Divide the text categorization method into the following three steps**: [5]**

a) Text representation
b) Feature selection
c) Text Categorization.

Using data mining we can predict only structured data but with using Neural Networks we can predict unstructured data also like data from news and social media. News and social media text information is an unstructured data which has a strong correlation with trends in these days. Because we can get easily market trends like ups and downs in the market from news and social media. News can be check or view from different sources like news paper, news channel, economic papers etc. Researchers used the Mood Tracking Tool to analyze twitter large information and found that the twitter "calm" level can predict the Dow Jones industrial average trend index.

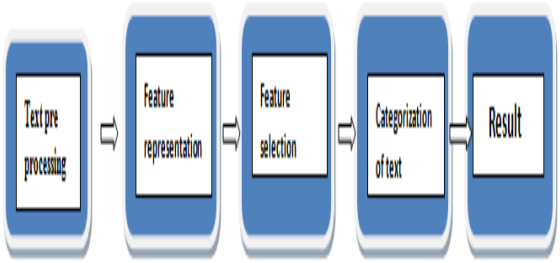

Figure: Text Categorization Flow

A) Text Pre-processing - Before representing the text, the text should be preprocessed because we need to unify the format on original data.

B) Feature Representation of Text - The text feature representation uses the feature configure on representation. In the process of representation, there are two key issues need to be considered: One is the choice of which features to characterize the semantic of the text, which means the text feature selection. The other is to choose which model can organize these features, which means the text representation model.

C) Feature selection -Feature selection is the process of selecting a subset of relevant features for use in model construction.

D) Categorization of Text - Text Categorization Method will used to stock market prediction using support vector machine in neural networks and analyze the result after prediction of stock market prices.

Remove Noisy values from Data Sets

1. Finding and removing Noise is an important task of data mining. It will use on predicted data sets after stock prediction.
2. Because SVM produce dataset are not 100% correct so after prediction outlier techniques will used for Noise Removal from predicted data sets.

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3. In this firstly hybrid approach will apply to all data sets and then distance based approach will apply.
4. Divide all the data into clusters and then apply hybrid based approach. Cluster based approach take less time than distance based approach. **[6]**

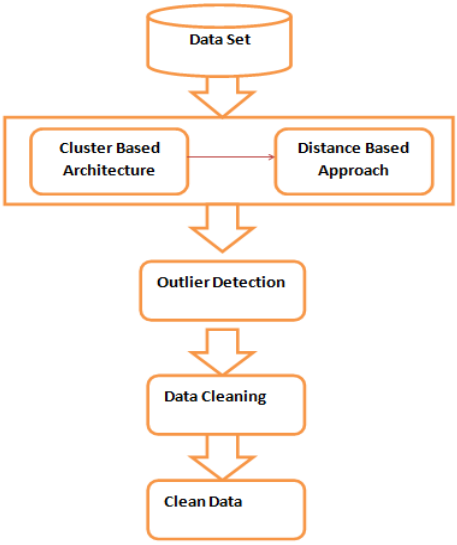
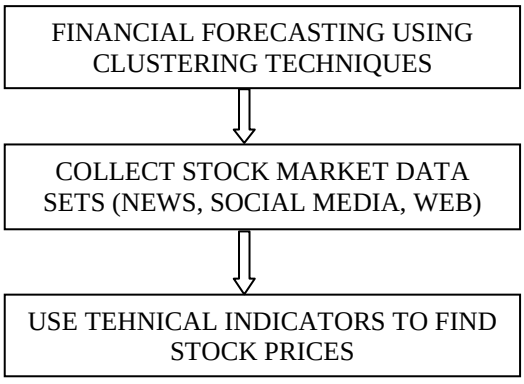


Figure. Architecture of Outlier Detection

METHODS FOR STOCK MARKET PREDICTION (EMA)

Stock market plays a very important role in business intelligence now a day. We can predict data using data mining and neural network techniques, fuzzy logic etc.
These techniques are used to predict stock price and trading signal automatically with acceptable precision. We have to use data mining and neural network techniques for stock prediction. Data mining can be applied on past and present financial data to generate patterns and decision making system.

FOLLOWING PROCESS WILL USE FOR STOCK MARKET PREDICTION



Methodologies of Stock Price Prediction

Fundamental Analysis

This method mainly concerns with organization rather than stock. The analyst takes their decision based on past performance of company for example earning forecast etc.

Technical analysis

This method deals with the determination of stock price based on past patterns of stock.. We can use average methods, support vector machine, time series analysis **[7]**. Result of technical analysis is much better than fundamental analysis.**[8]**

Indicators for stock prediction

In statistics, a moving average is a calculation to analyze data points by creating a series of averages of different type of subsets of the full data set. It is also called a moving mean and is a type of finite impulse response filter. Given a series of numbers and a fixed subset size, the first element of the moving average is obtained by taking the aver-age of the initial fixed subset of the number series. Then the subset is modified by "shifting forward", that is, excluding the first number of the series and including the next number which follows the original subset in the series. This creates a new subset of numbers, which is averaged. This process is repeated over the entire data series A moving aver-age is a set of numbers, each of which is the average of the related subset of a larger set of data points. A moving average may also use unequal weights for each datum value in the subset to emphasize particular values in the subset.
A moving average is commonly used with time series data to smooth out short-term fluctuations. For example, it is often used in technical analysis of financial data, like stock prices, returns or trading volumes. It is also used in economics to examine gross domestic product, employment or other economic time series.

Moving average: The average of past n values till today. A moving average is commonly used with time series data to smooth short term noisy data and highlight longer-term trends or cycles.

Simple moving average: A simple moving average (SMA) is the un-weighted mean of the previous data, the data can be in n number which is used in financial applications. An example of a simple moving average is equally weighted running mean for n-day sample of closing price is the mean of the previous n days' closing prices. . If those prices are k_M, k_{M-1}, . . . ,$k_{M-(n-1)}$ then the formula is**[9]**

$$\text{SMA} \quad {}^{k}M + {}^{k}M - 1 + \cdots + {}^{k}M - (n-1) = N \quad (1)$$

When calculating successive values, a new value comes into the sum and an old value drops out, meaning a full summation each time is unnecessary for this simple case,

$$^{\text{SMA}}\text{today} = {}^{k}M - n \; {}^{\text{SMA}}\text{yesterday} - k_M + {}_{n} \quad (2)$$

Exponential moving average: Give more weight age to more recent values while not discarding the older observation. In EMA we will give more weight age to recent values than historical data. For example we will give more weight age to data of 2015 rather than data of 2014.

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Rate of change: The ratio of current price to price n quotes earlier.. n is generally 5 to 10 days. For example we will check here recent data and ups and downs in recent days rather than older days…

Relative Strength Index: Measure the relative size of recent upward trends against the size of downward trends within specified time interval..It will check ups in market prices and downs in market prices..

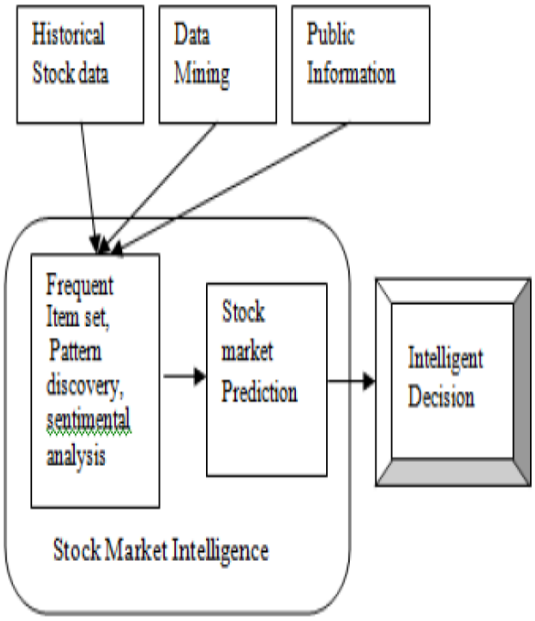

Figure. Process of Stock Prediction [10]

Collect data from following sources.

Method	Input Data Used	Goal
Classical market intelligence techniques	Technical indicators, Fundamental factors etc.	Predicting stock price trends or trading points or signals
Pattern Discovery	Only Historical stock data	Discovering charts or graph
Based on Public Information	Public information, expert's opinion and stock data	Predicting stock price trends

3. EXPECTED OUTCOMES

The project will focus on the helping the investors, businessmen and customers to decide that they have to invest money or not invest money. And people can also buy the products at normal prices when there will chances of hike of price in future according to prediction of stock market. As results will depend on the selection of the parameters like news related to business and news and information from social media which will related to stock market. Result is always relies on other factors like political, social, economical etc. Because if there will be any changes in political parties or government it will also effect on the market. Another example is that if price of currency will be down then market prices will also down. Thus stock market depends on various factors and parameters and we get result according to these parameters and factors. The output of the system will be user friendly therefore very easily decisions can be taken.

4. SUMMARY AND CONCLUSIONS

The extracted data can be used for applications ranging from market analysis. It decomposes the original stock index into the trend terms, the market fluctuation terms, the noise terms and time series with different economic features. Then SVM will use all moving average algorithm to predict stock prices. After prediction of stock prices using all algorithm the result of all algorithm will combine.. Then moving average algorithms result will check the duplicate and missing values in data and remove noisy data. In future we can integrate fuzzy logic in it to smooth out the data and remove the fluctuations.

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