

# A SURVEY ON TREND AND BEHAVIOUR ANALYSIS OF THE STOCK MARKET

<sup>1</sup>A. Kanimozhi, <sup>2</sup>Dr. B. Umadevi

<sup>1</sup>Research Scholar, <sup>2</sup>Assistant Professor & Head,

<sup>1</sup>P.G. & Research Department of Computer Science

<sup>1</sup>Raja Doraisingam Govt. Arts College, Sivaganga, Tamil Nadu, India.

<sup>2</sup>P.G. & Research Department of Computer Science

<sup>2</sup>Raja Doraisingam Govt. Arts College, Sivaganga, Tamil Nadu, India.

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## Abstract

In general the naïve as well as everyone who wish to invest in stock market need a view about the trend. Data mining is well founded technology is designed to help investors to discover hidden patterns from the historic data that have probable predictive capability in their investment decisions. The prediction of the trend flow is a challenging task of financial time series prediction. The investigating and prediction will give a forecast for the investor. In this survey paper, we would like to analyse various research published by various authors are considered for review.

**Index Terms :** Prediction, DM, Trading, ANN

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## I. INTRODUCTION

Stock market is basically nonlinear in nature and chaotic. Investors have focused with a variety of methods to analyse the stock market in time series pattern for many Decades. Conventional statistical and econometric economic models moderate and very less effective due to the special characteristics of the time series due to the factors such as, nonlinearity, nonstationarity and high noise-to-signal ratio. Due to this in significance interest was shifted to nonparametric data mining and machine learning methods. Data mining and neural network [1] can be effectively used to uncover the nonlinearity of the stock market. Several computing techniques need to be combined in order to predict the nature of the stock market.

Researchers' attentions are concerned greatly for many years in forecasting stock return. It involves a hypothesis of fundamental information that is openly available in the past that has some projecting associations to the future stock returns or indices. The information includes economic variables such as interest rates and exchange rates. It is difficult to assume the relationship between the stock returns and the financial and economic variables is perfectly linear.

The stock market prediction techniques are classified into four techniques such as Technical analysis approach, Fundamental analysis approach, Time series prediction and Machine learning algorithmic methods respectively. Fundamental analysis approach is finding out the true value of a stock and compares it with the current trading levels and recommends buying of stock which is traded lesser than its true value. Technical analysis refers to the price and volume movement of stock. Technical indicators are used to identify patterns and trends based on stocks' historical price and volume data. Short-term, mid-term and long-term data is considered for mapping and identifying corresponding stock trends as per investment strategies. Technical information is rapidly changing with time. Apart from intraday trading strategies, investors are considering closing price of stock as market price for that trading day.

Active trading is the act of buying and selling [2] securities based on short-term movements to profit from the price movements on a short-term stock chart. The attitude may differ from active trading strategy to buy hold strategy. The buy-and-hold strategy suggests that price movements over the long term will outweigh the price movements in the short term[2]. Active traders, on the other hand, believe that short-term movements and capturing the market trend are where the profits are made. The Four most popular active trading strategies and the built-in costs of each strategies such as Day Trading, Position Trading, Swing Trading and Scalping.

## II. RELATED WORKS

Data mining technologies are widely used in various applications such as financial domain, telecom domain, healthcare domain, agriculture domain, e-commerce, marketing etc. The nature of the stock market is affected by system uncertainties and other unknown (random) factors. In order to predict stock market future movement, researchers have implemented data mining methodologies like decision tree, association rule, clustering, artificial neural network, support vector machine, fuzzy system, genetic algorithm, time series mining and mixed methods. The review of the work has been given below.

The approach presented by Kannan, Sekar, Sathik and P. Arumugam were used data mining technology to discover the hidden patterns from the historic data that have probable predictive capability in their investment decisions. The prediction of stock market is challenging task of financial time series predictions. There are five Methods namely Typical price (TP), Bollinger bands, Relative strength index (RSI), CMI and MA used to analyzed the stock index. The authors got the profitable signal is 84.24% using Bollinger Bands rather than MA, RSI and CMI.

Jing Tao Yao and chew Lim tan made a study on artificial neural networks for classification, prediction and recognition. Neural network training is an art. Authors discuss a seven-step neural network prediction model building approach in their work. A Pre and post data processing/analysis skill, data sampling, training criteria and model recommendation is included in their article.

The authors developed by Tiffany Hui-Kuang and Kun-Huang Huarng [3] were used neural network in handling nonlinear relationship and new fuzzy time series model to improve forecasting. The fuzzy relationship is used to forecast the Taiwan stock index. In the neural network fuzzy time series model, [4] sample observations are used for training and out-sample observations are used for forecasting. The drawback of taking all the degree of membership for training and forecasting may affect the performance of the neural network.

Md. Rafiul Hassan and Baikunthu Nath were applied Hidden Markov Models (HMM) approach [5] to forecasting stock price for interrelated markets. HMM was used for pattern recognition and classification problems because of its proven suitability for modelling dynamic system. The author summarized the advantage of the HMM was strong statistical foundation. It is able to handle new data vigorously and computationally efficient to develop and evaluate similar patterns. The author decides to develop hybrid system using AI paradigms with HMM improve the accuracy and efficiency of forecast the stock market.

The authors Ching-Hseue cheng, Tai-Liang chen and Liang-Ying Wei were proposed a hybrid forecasting model using multi-technical indicators to predict stock price trends. There are four procedures described such as select the essential technical indicators, the popular indicators based on a correlation matrix and use CDPA to minimize the entropy principle approach. They used RST algorithm to extract linguistic rules and utilize genetic algorithm [6] to refine the extracted rules to get better forecasting accuracy and stock return. The advantage was discovered that produce more reliable and understandable rules and forecasting rules based on objective stock data rather than subjective human judgements.

M.H. Fazel Zarandi, B.Rezaee, I.B.Turksen and E.Neshat E were used a type-2 fuzzy rule based expert system is developed for stock price analysis. The purposed type-2 fuzzy model applies the technical and fundamental indexes as the input variables. The model used for stock price prediction of an automotive manufactory in Asia. The output membership values were projected [7] onto the input spaces to generate the next membership values of input variables and tuned by genetic algorithm. The type-1 method was used for inference and to increasing the robustness of the system. This method was used to robustness, flexibility and error minimization. It is used to forecast more profitable trading in stock markets.

The authors B.Umadevi, D. Sundar and P.Alli proposed a novel approach to create the portfolio through the multi objective optimization. Genetic algorithm and the Particle Swarm Optimization is used for the above purpose. The results obtained were compared against the classical Markowitz model. The data from the Nifty from March 2010 to October 2010 has been used. The Stocks from various sectors were used to build the portfolio.

### III. ROLE OF DATA MINING IN STOCK MARKET

Data mining is the emerging methodology used in stock market, finding efficient ways to summarize and visualize the stock market data to give individuals or institutions useful information about the market behavior for investment decision. The enormous amount of valuable data generated by stock market has attracted researchers to explore this problem domain using different methodologies [8]. The ultimate goal of data mining is forecasting. Some of its functionalities are associations and correlations, classification, prediction, clustering, trend analysis, outlier and deviation analysis, and similarity analysis.

#### 3.1 Association Rules

Association Rule is a Data Mining (DM) technique known as association analysis, which is useful for discovering interesting relationships hidden in large datasets. These relationships can be represented in the form of association rules or sets of frequent item sets. It can be applied to analyse data in different domains such as finance, earth science, bioinformatics, medical diagnosis, web mining, [9] and scientific computation.

In finance, association analysis is used for instance in customer profiling that builds profiles of different groups from the company's existing customer database. The information obtained from this process can help understanding business performance, making new marketing initiatives, analysing risks, and revising company customer policies [9]. Moreover, loan payment prediction, customer credit policy analysis, marketing and customer care can also perform association analysis to identify important factors and eliminate irrelevant ones.

#### 3.2 Classification

Classification is a different Data Mining (DM) approach, which assigns objects to one of the predefined categories. It uses training examples, such as pairs of input and output targets, to find an appropriate target function also known informally as a classification model. The classification model is useful for both descriptive and predictive modelling.

In finance, classification approaches are also used in customer profiling by building predictive models where predicted values are categorical. Financial market risk, credit scoring or rating, portfolio management, and trading also apply this approach to group similar data together. Classification can be considered [9] as one of the important analytical methods in computational finance. Rule-based methods can be used for the stock selection.

Besides, bankruptcy prediction can use its geometric methods where classification functions are represented with a set of decision boundaries constructed by optimising certain error criteria. Other methods such as Naïve Bayes classifiers, maximum entropy

classifiers were applied in bond rating and prototype-based classification methods such as nearest-neighbours classification was moreover used for the fraud detection.

### 3.3 Clustering

In cluster analysis groups similar data objects into clusters, however, the classes or clusters were not defined in advance [10]. Normally, clustering analysis is a useful starting point for other purposes such as data summarisation. A cluster of data objects can be considered as a form of data compression. Different domains can apply clustering techniques to [10] analysis data such as biology, information retrieval, medicine, etc.

In business and finance, clustering can be used, for instance, to segment customers into a number of groups for additional analysis and marketing [11] activities. As clustering is normally used in data summarisation or compression, there are not many financial applications that use this technique compared to classification and association analysis.

### 3.4 Prediction

Stock market prediction [12] is the act of trying to determine the future value of a company stock or other financial instrument traded on an exchange. The successful prediction of a stock's future price could yield significant profit. The efficient-market hypothesis suggests that stock prices reflect all currently available information and any price changes that are not based on newly revealed information thus are inherently unpredictable. Others disagree and those with this viewpoint possess myriad methods and technologies which purportedly allow them to gain future price information [13].

#### 3.4.1 Neural network

The stock market trend prediction has moved into the prominent techniques which use the artificial neural networks (ANNs). The ANNs [14] can be thought of as mathematical function approximators. The most common form of ANN in use for stock market prediction is the feed forward network utilizing the backward propagation of errors algorithm to update the network weights. These networks are commonly referred to as Back propagation networks. The more appropriate for stock prediction is the time recurrent neural network (RNN) or time delay neural network (TDNN).

#### 3.4.2 Time Series

Time Series Forecasting (TSF) Time series forecasting is a process of analyzing time series data and predicting the future outcome. It uses statistical techniques to model and explain time-dependent series of data points. Time Series Forecasting is a widely used technique in financial forecasting.

#### 3.4.3 Other Techniques

The other prediction data mining techniques that can be applied for financial datasets are grouped in three categories: optimization, regression and simulation. For instance, portfolio selection, risk management and asset liability management can use different optimisation techniques such as genetic algorithms dynamic programming, reinforcement learning, etc. Besides, linear regression [9] and wavelet regression are popular methods in the domain of financial forecasting, option pricing and stock prediction [14].

## IV. CONCLUSION

Data mining has been extensively used to extract vital information from historical stock data to analyze and predict its future trends. This survey present stock market related information, process, technical indicators and tools to analyze stock exchange data in addition to that it covers review on various techniques of data mining to predict stock market using various strategies for investor and brokers. Based on this information, the new research can be initiated with suitable data mining techniques to cater investors' requirements.

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### Authors' Biography

**A. KANIMOZHI** is an M.Phil Research Scholar in PG & Research Department Of Computer Science, Raja Doraisingam Government Arts College, Sivaganga, Tamilnadu, India. Her research concentration include in Data mining, Machine Learning and its applications.



**Dr. B. UMADEVI** has received her Doctoral degree in Computer Science from Manonmaniam Sundaranar University, Tirunelveli, India. Currently working as Assistant Professor & Head- P.G and Research Department of Computer Science, Raja Doraisingam Government Arts College, Sivagangai-Tamilnadu, India. She has over 23 years of Teaching Experience and published her research papers in various International, National Journals and Conferences. Her research interests include Data Mining, Soft Computing and Evolutionary Computing. She got the Best Paper Award for her publication in the IEEE International Conference on Computational Intelligence and Computing Research held on 27<sup>th</sup> Dec 2013 at VICKRAM College of Engineering and Technology.

