

An Enhanced Forecasting System for Trading Actions using Biclustering Algorithm

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To Cite this Article

J.Sudha and S.Sharmila Ranjani, "An Enhanced Forecasting System for Trading Actions using Biclustering Algorithm", *International Journal for Modern Trends in Science and Technology*, Vol. 03, Issue 05, May 2017, pp. 261-266.

ABSTRACT

As financial growth increased, trading system play key role in current running world. A stock market is a primarily virtual exchange of securities and risk that is, shares for raising the finance and derivatives of a leading companies. It is a nonlinear dynamic system that is influenced by a lot of factors such as national policies, the economic environment, supply-demand relationships, etc. It is a great benefit to analyze the price movement and provide trading rules to guide investors in making trading decisions. Technical analysts always tries to find out price patterns and market trends for making investment in finance markets and these patterns helps to take right decisions related to trading system and making investments. For taking such a decision, someone needs to analyze the price movement and provide trading rules to guide investors, so that they can take correct trading decisions. For analyzing and taking trading decisions, the Biclustering Algorithm is proposed to discover effective trading patterns that contain a combination of indicators from historical financial data series. The mined patterns are considered as trading rules and can be divided in three trading actions (buy, sell, and no-action signals).The experiment is implemented on real dataset and the results prove the effectiveness of the proposed algorithm.

Keyword- Biclustering, machine learning, technical analysis, trading rules.

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I. INTRODUCTION

Stock market also called as share market is the aggregation of sellers and buyers of stocks or shares. Stock exchange is place by which people and companies can trade stocks. In current development world, many countries, companies, retailers, manufactures exchanging their goods, stocks or shares. Trade in stock market means transfer for money of a stock or security form seller to buyer. Participants in stock market are either small individual stock investors or large trade investors. Their sell or buy orders may be executed by a stock exchange trades .For making such investment in stock market first

analyse the market and there are many different approaches for analyst the market. Two basic methods are classified as fundamental analysis and technical analysis.

Fundamental analysis is an investing approach where in an investor tries to choose winning stocks by studying a company's earnings history, balance sheet, management, product line and other factors that will affect its profitability and growth..

Technical analysis is another kind of method in the stock market analysis. It summarizes the typical rules in the market and forecasts the future trend by analyzing the historical price and the trading volume of the stocks.

Entities in Stock market

- Technical analysis is another kind of method in the stock market analysis. It summarizes the typical rules in the market forecast trend by analysing the historical price and trading volume of the stocks.
- Trader is a Merchant or retailer who attempts to buy for wholesale and sell at profit. Trader can buy or sell financial instruments like shares, stocks, etc.
- The system is consist of a group of specific rules or parameters that entry and exit signals are always marked on a chart in real time and gives immediate execution of a trade.
- An investor allocates capital with the expectation of future financial return. i.e. someone who allocates a capital and someone who buys a stock are investors. And shareholder is also called investor.

IMPORTANCE OF THE STOCK MARKET

Stock market is an important part of the economy of a country. The stock market plays a pivotal role in the growth of the industry and commerce of the country that eventually affects the economy of the country to a great extent. That is reason that the government, industry and even the central banks of the country keep a close watch on the happenings of the stock market. The stock market is important from both the industry's point of view as well as the investor's point of view.

The stock market is primarily the place where these companies get listed to issue the shares and raise the fund. In case of an already listed public company, they issue more shares to the market for collecting more funds for business expansion. For the companies which are going public for the first time, they need to start with the Initial Public Offering or the IPO. In both the cases these companies have to go through the stock market.

For investing in the stocks or to trade in the stock the investors have to go through the brokers of the stock market. Brokers actually execute the buy and sell orders of the investors and settle the deals to keep the stock trading alive. The brokers basically act as a middle man between the buyers and sellers. Once the buyer places a buy order in the stock market the brokers finds a seller of the stock and thus the deal is closed.

So the stock market is not only providing the much required funds for boosting the business, but also providing a common place for stock trading. It is the stock market that makes the stocks a liquid asset unlike the real estate investment. It is the stock market that makes it possible to sell the stocks at any point of time and get back the investment along with the profit. This makes the stocks much more liquid in nature and thereby attracting investors to invest in the stock market.

II.EXISTING SYSTEM

In Stock Market there is no opportunity to consistently gain profit over the average in the market, and it is pointless to predict future market price behavior, whether by fundamental analysis or technical analysis. Much research into the stock market using data mining and computational intelligence techniques have shown positive results. Frequently used techniques include genetic programming (GP)[2], artificial neural networks (NN)[4] and template matching[3]. The Genetic Algorithm has some randomness, which will influence the result if the iteration times are not enough. The number of features could not be controlled in the first version since there might be crossover and mutation happening at any time[16]. Besides, the result might be different due to the randomness of Genetic Algorithm, however, if the number of generation and the size of population are large enough, the result should go into a steady situation and have optimal solution[7]. Basically, all these methods belong to technical analysis and all the research showed that trading success can be achieved with these methods. However, drawbacks exist for all these methods.

DISADVANTAGES OF EXISTING SYSTEM

- The Genetic Programming (GP) is designed for global optima, which cannot guarantee to find the best solution, and it is difficult to avoid the problem by making appropriate design choices.
- The Neural Network (NN) is dominant in stock prediction, the models have limitations due to noise and complex dimensionality of data, resulting in unconvincing results.
- Template matching is used for the fitting, but the fitting process may be unstable, which may cause the rising flag template fit to be lower than that of

the declining flag and lead to missing the trading opportunities.

- Lack in accuracy and improve Computational Cost.

III. SYSTEM ARCHITECTURE

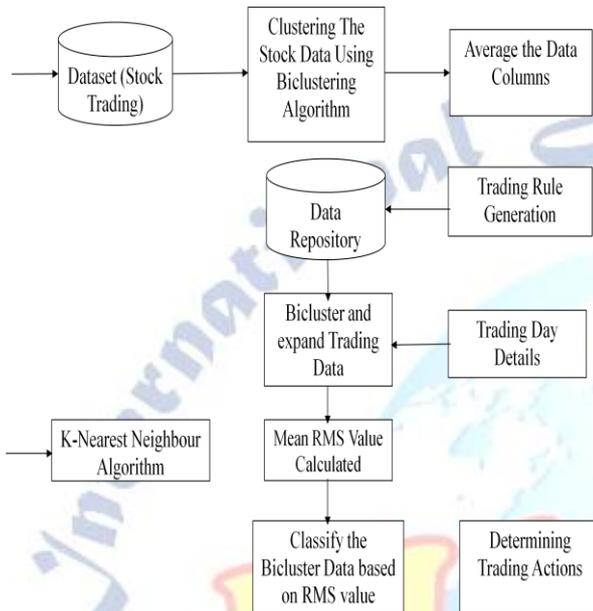


Figure 1: System Architecture

IV. PROPOSED SYSTEM

Since stock market data are highly time-variant and are normally in a nonlinear pattern, predicting the future price and investment decisions of a stock is highly challenging. With the increase of economic globalization and evaluation of information technology, analyzing stock market data for predicting the trading actions of the stock has become increasingly challenging, important and rewarding. In the proposed system a novel method incorporating a Biclustering Algorithm and the K Nearest Neighbor (BIC-KNN) are proposed to discover significant technical trading patterns and to determine the trading actions (figure 1). The biclustering algorithm is a type of data mining method that can extract coherent patterns, each of which contains a subset of indicators with different time lengths. Thus, a combination of different technical indicators in a coherent pattern can be found using the biclustering method if they behave in a similar manner for the same sort of turning points. The mined patterns are considered as trading rules and can be divided in three trading actions. By these trading rules, it will be easy for investors to take a right decision related to trading system.

ADVANTAGES OF PROPOSED SYSTEM

- It removes the possibility of human errors and influence of emotions in decision making.
- Improve time Efficiency in Automation Prediction Process.
- Improve Accuracy and reduce computational cost.
- Simultaneous automated checks on multiple market conditions.
- Computer-based algorithms, which can analyze many stocks simultaneously and determine quantifiable founded objective predictions, are becoming increasingly more popular to investors as an improved strategy for optimizing returns and mitigating prospective risk.
- Proposed system consist of four modules and are given below,

A. TRAINING DATA SELECTION

The Dow Jones is a large index traded on the New York stock exchange (figure 2). The dataset will contain the daily percentage change in stock price for all 30 components of the Dow Jones [1]. All companies in the index are large publicly traded companies and by using the historical data construct a data matrix where the rows correspond to trading days and the columns correspond to technical indicators with different periodic parameters and future returns. It is commonly considered that the price movement can be described by the percentage changes of the price in the sequence of trading days [10]. Replace the original value of elements with the percentage of difference between the original values and the closing prices of corresponding trading days on the columns.

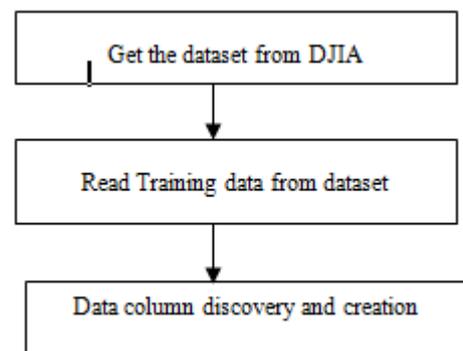


Figure 2: Training dataset selection

B. BICLUSTERING THE DATA

After generation of data matrix search for Biclusters which is submatrix with coherent patterns. For searching bicluster use biclustering algorithm and to find similar elements in single column a agglomerative algorithm is applied[3]. The detected clusters from all columns are treated as bicluster seeds (BS) and placed in an HC_Set. Any of the BS can be expressed as a pair (R,Cj). The newly formed sub-matrix satisfies the criterion of MSRS (i.e., the MSRS score is less than a preset threshold)(figure 3). This procedure is repeated until no new column can be added to BS, and then the new BS with expansion in columns can be regarded as a bicluster that is placed in Bic_Set[12]. A bicluster is translated into a trading rule by averaging each column. An effective trading rule can help the trader to make a trading decision by predicting a moving direction of the financial price.

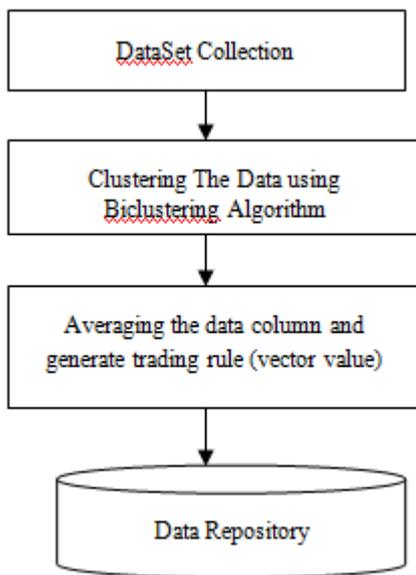


Figure 3: Biclustering the Data

C. CALCULATE THE RMS (ROOT MEANS SQUARE) VALUE

The present trading day stock market data are collected and the data will contain the opening value, low value, high value and closing value of a particular company. a trading day is considered to match a trading rule when the values of the corresponding technical indicators of the trading day are very similar to the values of the corresponding technical indicators of a trading rule[15]. The root-mean-square (RMS) is used to

measure the similarity between trading day and trading rule.

The RMS value is calculated by using the formula,

$$RMS = \frac{\sqrt{\sum_{k \in ST} (V_{td}(k) - V_r(k))^2}}{n_k}$$

Where ST denotes the set of technical indicators of a special trading rule, n_k denotes the number of indicators in ST, $V_{td}(k)$ denotes the value of the indicator (corresponding to the kth indicator in ST) for the current trading day, and $V_r(k)$ denotes the value of kth indicator in the trading rule.

D. DETERMINATION OF TRADING ACTION USING KNN

A five-NN classification method is used to determine the trading action of a trading day based on the matching of trading rules and trading day[19]s. By Using a predefined threshold T_{rms} , a neighboring region is defined for each trading day. Several trading rules may fall into the region (i.e., $RMS \leq T_{rms}$). T_{rms} is set to the mean of all calculated RMS between every trading day and every trading rule. Based on a voting strategy, the trading day is classified as a specific pattern (i.e., buy, sell, or no-action) with the largest votes[20]. If no pattern takes only the largest votes, the trading signal is no-action for the next trading day(figure 4). Once the trading signal is determined for a trading day in testing period, corresponding action is made on the next trading day with opening price.

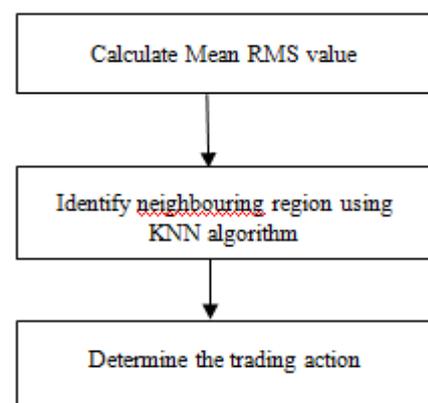


Figure 4: Determination of trading action using KNN

V. RESULT AND DISCUSSION

The trading rules found by the Biclustering algorithm in the training period are employed to guide the business conduct in the testing. The trading strategy is that if a trading day forecast returns a signal to buy, then open a position in the next trading day until a signal to sell occurs which means to close the position on the next trading day. During the closing time even there are some signals to buy emerge, no operations will be executed. Repeat this trading mode during the test period. The trading rules found by the BIS algorithm could gain more profits than the trading rules generated by buy-and-hold (BAH), genetic programming (GP), and intelligent hybrid system (IHS) model. Through the above analysis of experiments, the proposed BIS algorithm has obvious advantages compared with other classical strategies in the stock trading. Although there are negative returns in some stocks (such as TRP), generally speaking, the BIS method can obtain better effect in mining stock exchange rules and assisting trading decisions.

VI. CONCLUSION AND FUTURE ENHANCEMENT

Trading system is having more importance in development of world. Technical analysts need to take right decisions related to trading system for making investments[13]. The Proposed system is developed for analyzing and generating the trading rules. To implement such a system, the proposed Bi-clustering mining is used to generate effective technical Biclusters. The mined patterns are considered as trading rules and can be divided in three trading actions (buy, sell, and no-action signals). Proposed bi-clustering approach is applied for the optimization of trading actions. [8]By these trading rules, it will be easy for investors to take a right decision related to trading system. In the proposed survey studied the different bi-clustering approaches as well clustering. And got the idea of proposed approach how to apply such scenarios on historical data like financial market or any benchmark data. All method out[7]performs four existing trading strategies, indicating its sound performance for trading in financial markets. In above process expect that the novel idea of converting the bi-clusters into trading rules will lead to a new research topic in finance theory and applications.

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