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Generating Trading Rules Using Biclustering in Financial Market

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ABSTRACT:As financial growth increased, trading system play key role in current running world. 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, we proposed to develop Biclustering mining to discover effective trading patterns that contain a combination of indicators from historical financial data series. Biclustering is actually a special branch of clustering algorithms because it clusters the data along the row and the column simultaneously in a 2-D data matrix. The mined patterns are considered as trading rules and can be divided in three trading actions (buy, sell, and no-action signals). For optimization of trading rules we proposed particle swarm algorithm.

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, Technical analysts try to find out appropriate trading rules in the stock market. They study the historical data, primarily price and volume, to forecast the direction of prices and make trading decisions based on the predictions. But, investors can't find correct results related to trading system, as we all know stock prediction is difficult to predict because its structure is dynamic and highly complicated. As growth changes its price pattern will change. To avoid such a faulty prediction, investors need right trading rules. In this paper, we proposed to develop Bi clustering method. Bi clustering mining is to discover effective technical trading patterns that contain a combination of indicators from historical financial data series. Bi clustering is actually a special branch of clustering algorithms because it clusters the data along the row and the column simultaneously in a 2-D data matrix. The mined patterns are considered as trading rules and can be divided in three trading actions (buy, sell, and no-action signals). These classifications will be useful for making investments and taking right trading decisions in financial markets.

1.1 Entities in Stock market:

1.1.1 Technical analyst:

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.

1.1.2 Trader:

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.

1.1.3 Trading System:

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.

1.1.4 Investor:

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.



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1.2 Overview of Trading Rules:

A critical part of any option trading system is the trading rules. These rules define what I will and won't do regarding trading a particular strategy. The trading rules cover such things as:

- What trade - what stock or ETF
- When to do trade - under what conditions
- When to enter a trade - any technical indicators
- When to exit a trade - rules for getting profit or minimizing a loss.

II. RELATED WORK

In the recent research, different techniques used for having the result of stock market

[1] Qinghua Huang, Ting Wang, Dacheng Tao, "Biclustering Learning of Trading Rules" This paper innovatively proposes the use of biclustering mining to discover effective technical trading patterns that contain a combination of indicators from historical financial data series.

[2] J. Y. Potvin, P. Soriano, and M. Vallee, "Generating trading rules on the stock markets with genetic programming," used GP to generate trading rules on stock markets. Technical analysis is used for devising of trading rules which exploit fluctuations in financial market.

[3] X. Lin, Z. Yang, and Y. Song, "Intelligent stock trading system based on improved technical analysis and Echo state network," in this paper enhanced conventional technical analysis is used with genetic algorithms (GA) by studying trading rules from history for individual stock, and then combined variety of trading rules together with Echo state network to provide trading suggestions.

[4] Y. Chen, S. Mabu, K. Hirasawa, and J. Hu, "Genetic network programming with sarsa learning and its application to creating stock trading rules," used genetic network programming with Sarsa learning to create a stock trading model.

[5] T. Chavarnakul and D. Enke, "Intelligent technical analysis based equivolume charting for stock trading using neural networks," in this paper profitability of stock trading by using a NN model developed for taking the trading decisions of the volume adjusted moving average (VAMA) and the ease of movement (EMV). The problem of over fitting in the NN cannot always be easily avoided.

[6] Y. C. Chien and Y. Chen, "Mining associative classification rules with stock trading data—A GA-based method," there is proposed GA-based algorithm used for building an associative classifier that generate trading rules from numerical technical indicators.

[7] J. Wang and S. Chan, "Stock market trading rule discovery using pattern recognition and technical analysis," this paper examined the potential profit of bull flag technical trading rules using a template matching technique based on pattern recognition for the Nasdaq composite index (NASDAQ).

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III. PROPOSED METHODOLOGY

3.1 System Architecture:

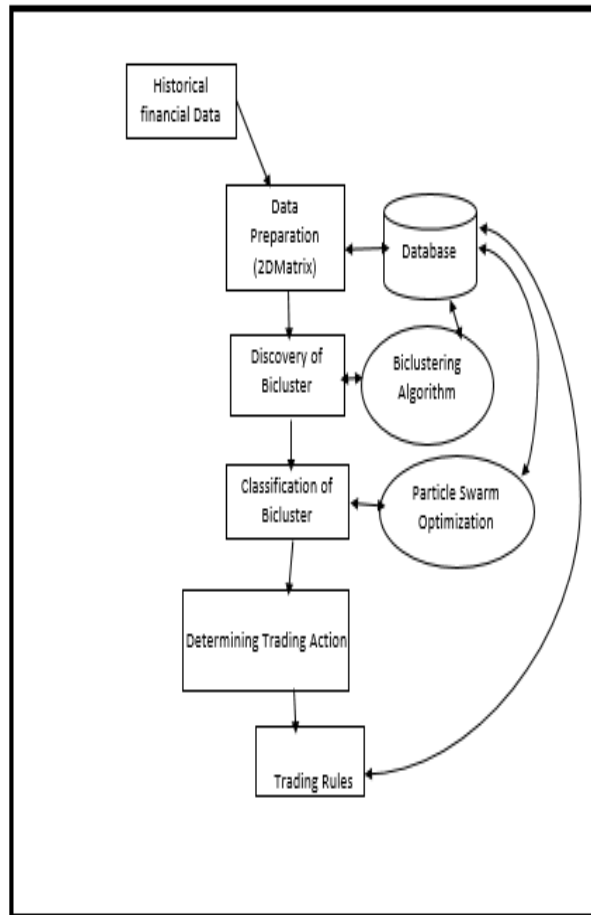


Fig. 1: System Architecture

As shown in above fig.1, first, we provide input as stock data. The system will give this input to Bi clusters mining. Then it finds clusters and given it for classification. We classify clusters for finding subsets of columns and rows so that we can again check whether any cluster is there inside. From these bi clusters, it will find trading actions, and compare it with trading rules and trading days and take appropriate decision.

3.2 Biclustering Algorithm:

Biclustering is actually a one of the best clustering algorithms, because it clusters the data along the row and the column simultaneously in a 2-D data matrix. Bi cluster will find semantic relationship between clusters, rows and columns. A bicluster is a sub-matrix with a coherent pattern in a data matrix.

3.3. Particle swarm:

In particle swarm optimization (PSO) is a method that optimize the problem with regard to a given measure of quality. PSO optimizes a problem by having a member of set of reasonable solution which satisfies all constraints and moving these particles around in the search-space over the particle's position and velocity. Each particle's movement is influenced by its local best known position but, is also guided toward the best known positions in the search-space, which are updated as better positions are found by other particles. This is expected to move the swarm toward the best solutions. This proposed algorithm will optimize the trading actions.



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Steps for particle swarm:

Step1: Initialize the velocities and position of particles

Step2: Calculate the objective value.

Step3: If calculation is finished then get results. Else update the velocities and position of particle.

The Proposed work as follows:

Step 1: Input data preparation:

For a stock or a financial composite index, a 2 D data matrix is constructed using historical data where the rows consist of trading days and the columns consist of technical indicators with different parameters and future returns.

Step 2: Discovery of Biclusters:

After generation of data matrix, we search for biclusters which is sub matrix with coherent patterns. For searching bicluster we apply Biclustering Algorithm.

Step 1:

To find similar elements in single column for this agglomerative algorithm is applied to each column of data matrix.

Step 2: To expand each Bicluster then filter out the duplicate biclusters.

Step 3: Classification of the Biclusters

A bicluster is translated into a trading rule by averaging each column. Because each column of a bicluster corresponds to a specific technical indicator. An effective trading rule can help the trader to make a trading decision by predicting a moving direction of the financial price. Three types of trading actions occur in the stock market, i.e., buy, sell, and no action, so all of the trading rules are then classified into three trading sets: 1) buy set 2) sell set and 3) no-action set. Particle swarm is proposed for optimization of best trading actions.

Step 4: Determining of Trading Actions

The trading actions are determined based on the matching of trading rules and trading days. For each trading day, the values of all the technical indicators are calculated. Since a trading rule is a vector of technical indicators with specific values, 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 technical indicators of a trading rule.

IV. CONCLUSION

Trading system is having more importance in development of world. Technical analysts need to take right decisions related to trading system for making investments. The Proposed system is developed for analyzing and generating the trading rules. To implement such a system, the proposed Biclustering 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 Particle swarm optimization is applied for the optimization of trading actions. By these trading rules, it will be easy for investors to take a right decision related to trading system.

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