Attachment Format #3 　　　　　　　　　　　　　　　　No. 1

Doctoral Dissertation Abstract

Major　　System　Design　Engineering

Course　　Intelligent　Information　Systems

Name　　　Md.　Asaduzzaman

1. Dissertation Title (If in English, add the Japanese translation.)

　　　New Decision Making Algorithms for Stock Market

　　　株式市場における新しい意思決定アルゴリズム

2. Abstract (Roughly 2,000 Japanese characters or 800 English words)

　　Stock market forecasting is one of the most challenging tasks in the world. Much research have tried to discover the secret mechanisms in the stock market, but the findings remain elusive. Some factors that influence the market have been revealed, but it is not comprehensive enough. The factors depend on variables like the stock markets, seasonal changes, government policy, the world economy, natural disasters, crude oil price, exchange rates, etc. For this reason, the stock market data is one of the most non-linear natural data.

　　Two types of forecasting are used in stock price forecasting drills by researchers. Most researchers predict the train of the previous trainer to see how closely they can extrapolate in the next few days. Very little research has been conducted with drills using decision-making (turning points) algorithms for the stock market. Moreover, the decision plays a leading role in profit-making　in the stock market.

　　In this study, a new forecasting model has been proposed for stock market decision making. We integrated the neural network and data mining tools to estimate the stock market decision points to buy or sell. It is through the measurement of buy and sell points that people can estimate the transaction time which can caution shareholders of high risk. The key to effective shareholding is to identify the period of risk-free transaction.

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Recently, research on stock forecasting has taken two interesting directions. One focuses on the prediction of the price variation in the short-term, and the other one focuses on the prediction of the turning points of the price. Commonly the turning points have a longer period than the price variation in the short-term, so the high frequency characteristic of data can be reduced. In addition, the turning point is more important than the non-turning point because it can yield a higher profit if it is predicted accurately. This paper focuses on the prediction for the turning points of the stock price movement.

Our research considers mainly ANN, Data mining, decision-making and hybrid algorithm. The Shannon entropy algorithm is also used at the data pre-processing stage. The Shannon entropy is a basic measure in information theory that calculates uncertainty. The entropy is used to find the nature of each share. It is possible to use other techniques for this purpose. The Shannon has some advantage over the others in the stock price prediction. This technique may be used for all time series/ financial analysis.

We also introduced a new technique to find the turning points called local saturation methods (LSM) for piecewise linear representation (PLR). PLR reduces the high frequency and provides a certain decision for a certain period. The LSM is easy to implement and avoids high sensitivity threshold values. We used two types of data smoothing called normal data smoothing and weighted data smoothing, to find the LSM. LSM is also a new and challenging technique in predicting stock prices.

A new model has been proposed which hybridises historical information and current information, called the hybrid model or combined model. The data mining tool called the least square autoregression is used to retrieve the instantaneous property/attitude, and the neural network tool is used to reclaim the historical property/attitude. The combination of instantaneous and historical information yields better prediction ability. Sometimes, the output of these techniques show opposite properties/directions. An intelligent filter is used to avoid this problem. In this study, three decisions are taken, namely, buy, sell and no decision. We are trying to find the buy or sell points through the transaction. If no buy/sell is found, the decision is defaulted to no transaction or holding the shares.

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Using the findings from this research, one may plan their investing and harvesting time. Shareholders want to reap a profit from their investments. We know that the financial time series is one of the most nonlinear, diverse and unpredictable data. Hence, there is a chance they may lose their wealth. At the same time, it is difficult to claim that our proposed model will earn shareholders a good profit. We want to state instead that if our methods are followed, the risk of investing will be significantly reduced. Finally, we integrated historical information (previous train) and current information (current influencing factor) to arrive at the decision to buy, sell or hold.

The proposed research model discusses only the stock markets data analysis, but it is applicable for all kinds of forecasting and decision-making problems. The historical data of the stocks data are based on research direction. Many online sources contain data on the stock price transaction. The data for this paper was collected mainly from the Google finance data store. Every working day witnesses many transactions in the stock market. The shareholders buy and sell their share and leave a trail of data that can be analysed.