A Survey on Stock Market Prediction Using Various Algorithms

Abhishek Gupta, Department of Information Technology, NRI Institute of Information Science and Technology, Bhopal (M.P.)
abhishek.pindari820@gmail.com

Dr. Samidha D Sharma, Department of Information Technology, NRI Institute of Information Science and Technology, Bhopal (M.P.)
samidhad2000@gmail.com

Abstract

Stock market prediction is a technique of predicting the future value of the stock markets on the basis of the current and the previous information available in the market. Stock market prediction is an important issue for investigating in academic and financial research. There are various techniques available for the prediction of the stock market value. Here in this paper a survey of all the techniques and schemes for stock market prediction are discussed and analysed.

Keywords: Stock Market, Prediction, Analysis.

Introduction

The prediction of stock market movement is an important area of financial forecasting. Notwithstanding years of study and the newest technology, it seems that no technique has been exposed that constantly works. Essential analysis frequently works best over longer periods of time, where technical analysis is more appropriate for short term trading. Researchers have made many attempts to predict the performance of financial market. Many models or approaches like artificial intelligence techniques such as Neural Network and Fuzzy Systems had proposed. However it is difficult to interpret their results. They are unable to view the nature of interactions between technical indicators and stock market fluctuations.

The difficulty with technical analysis is that a complete pattern is required to make an accurate prediction on the stock movement. Preferably, such a forecast should be made before the pattern was completed to facilitate prediction. For this task execute a Time-Delay Artificial Neural Network known as Midas. Similar to Metis, Midas receives input data including close, open, low and high prices per day for a particular stock ticker over a period of time, along with the equivalent trading quantity for every day. This data is adequate for employing technical analysis through Metis and is therefore used as the input data for Midas as well [2].

The financial market unusual from a lot of substantial systems like we identify the weather is that the financial market is an arrangement of complex feedback system. What people expect prices to be concerns the prices they examine and then the prices they examine then influences how they are going to form their expectations about what the prices will be in the after that stage. The market is essentially an unresolved creature or an undecided institution, it’s an institution where public trade risk, exchange risk, and that’s why it’s present. And so if it were probable to forecast it there would be no risk. In individuals, I believe there cannot be any publicly accessible system to predict a financial market. Alternatively, neural networks have been originated useful in stock price prediction [3-4]. Both feed forward and recurrent neural networks have been investigated and good results have been acquired. That means the calculation software would be very useful to support entity in accomplishing a complete decision. In this paper, assuming that it is feasible to predict markets, a prediction system is extended using fuzzy neural networks with a learning algorithm to predict the expectations stock assessments. The system consists of numerous neural networks components. These models are all used to discover the relationships between unusual technical and economical indices and the judgment to buy or sell stocks. The inputs to the networks are practical and financial indices. The amount produced of the system is the choice to buy and sell. There are numerous neural network methods for stock forecast, such as recurrent neural network, Time Series method and Feed-forward neural network method, etc. [4]. When compared to these techniques, Fuzzy neural network is a very valuable and efficient method to progression, which is given in detailed in the later sections.

Stock market prediction is the act of trying to determine the future value of a company stock or other financial instrument traded on a financial exchange. The flourishing calculation of a stock’s future price could yield momentous profit. Some consider that stock price movements are governed by the random walk hypothesis and thus are unpredictable. Others oppose and those with this perspective possess a myriad of methods and technologies.
which purportedly allow them to gain future price information [5].

Fuzzy Neural Networks

According to the mechanism of fuzzy logic control system, the fuzzy neural network typically has 5 functional layers: (1) Layer one is the input layer. (2) Layer two is the fuzzification layer; (3) Layer three is the fuzzy reasoning layer that may consist of AND layer and OR layer; (4) Layer four is the de-fuzzification layer; (5) Layer five is the output layer. The design of a fuzzy neural network is described in Figure.

![Figure 1: Architecture of the fuzzy neural network](image)

Each neuron in the fuzzification layer represents an input membership function of the antecedent of a fuzzy rule. One familiar method to execute this layer is to express membership functions as discrete points. Thus for a fuzzy rule "IF X1 is A1 and X2 is A2 ... THEN Y is B", A's characterize the possibility distribution of the antecedent clause "X is A". Each of the hidden nodes is defined as a fuzzy reference point in the input space. The function of the de-fuzzification layer is for rule assessment. Each neuron in this layer symbolizes a consequent proposition "THEN Y is B" and its membership function can be implemented by combining one or two sigmoid functions and linear functions [6].

Related Work

- Nair, Mohandas and Sakhthivel [7] proposes a decision tree rough set hybrid system for stock market prediction presents the design and performance evaluation of a hybrid decision tree-rough set based system for predicting the next day’s trend in the Bombay Stock Exchange (BSESENSEX). This system outperforms both the neural network based system and the naïve bayes based trend prediction system.
- Lee, Anthony, Lin, Kao, and Chen [8] propose an effective clustering approach to stock market prediction, which combines the advantages of K-means and HAC, to perform stock market prediction. This method consists of three phases. First, it converts each financial report into a feature vector and use HAC to divide them into clusters. Second, for each cluster, it recursively apply K-means to partition each cluster into sub-clusters so that most feature vectors in each sub-cluster belong to the same class. Then, for each sub-cluster, it chooses its centroid as the representative feature vector. Finally, it employs the representative feature vectors to predict the stock price movements.
- Kim and Han [9] propose genetic algorithms approach to feature discretization in artificial neural networks for the prediction of stock price index. In this Genetic Algorithm is employed not only to improve the learning algorithm, but also to reduce the complexity in feature space. GA optimizes simultaneously the connection weights between layers and the thresholds for feature discretization. The genetically evolved weights mitigate the well-known limitations of the gradient descent algorithm. This genetic based model outperforms the other conventional models.
- Kim [10] proposes artificial neural networks with evolutionary instance selection for financial forecasting. He uses a new hybrid model of ANN and genetic algorithms (GAs) for instance selection. An evolutionary instance selection algorithm reduces the dimensionality of data and may eliminate noisy and irrelevant instances. In addition, it searches the connection weights between layers in ANN through an evolutionary search. The genetically evolved connection weights mitigate the well-known limitations of gradient descent algorithm. GA-based learning and the instance selection algorithm significantly outperforms the conventional GA-based learning algorithm.
- Matsui and Sato [11] propose neighborhood evaluation in acquiring stock trading strategy using Genetic algorithms. This method involves evaluation for neighboring points of a genetic individual in fitness
landscape as well as itself. It reduces the influence of the singular points in the training phase and to improve the profit in the testing phase.

- Mahdi, Hamidreza and Homa [12] propose stock market value prediction using neural networks. In this, two kinds of neural networks, a feed forward multi layer perception (MLP) and an Elman recurrent network, are used to predict a company’s stock value based on its stock share value history. The application of MLP neural network is more promising in predicting stock value changes rather than Elman recurrent network and linear regression method. However, based on the standard measures Elman recurrent network and linear regression can predict the direction of the changes of the stock value better than the MLP.

- Shweta, Rekha and Vineet [13] propose predicting future trends in stock market by decision tree rough-set based hybrid system with HHMM. It presents a hybrid system based on decision tree rough set, for predicting the trends in the Bombay Stock Exchange (BSESENSEX) with the combination of Hierarchical Hidden Markov Model. It also presents future trends on the bases of price earnings and dividend. The data on accounting earnings when averaged over many years help to predict the present value of future dividends.

- Sam Mahfoud and Ganesh Mani [14] propose financial forecasting using genetic algorithms a new system that utilizes genetic algorithms (GAs) to predict the future performances of individual stocks. More generally, the system extends GAs from their traditional domain of optimization to inductive machine learning or classification. The overall learning system incorporates a GA, a niching method and several other components.

- Chenoweth, Zoran and Lee [15] propose embedding technical analysis into neural network based trading systems, it compare an NN-based trading system using a threshold-based pattern filtering technique to a system using a more sophisticated preprocessing technique utilizing the ADX indicator to identify trends in the S&P 500 index. The results indicate that the ADX-based directional filter used for preprocessing works better with smaller ADX smoothing parameter values. However, the simple threshold-based filtering technique still outperforms the ADX based filtering technique with the rule-based integration strategy.

- Kuang and Jane [16] propose a hybrid model for stock market forecasting and portfolio selection based on ARX, grey system and RS theories. In this approach, financial data are collected automatically every quarter and are input to an ARX prediction model to forecast the future trends of the collected data over the next quarter or half-year period. The forecast data is then reduced using a GM(1,N) model, clustered using a K-means clustering algorithm and then supplied to a RS classification module which selects appropriate investment stocks by applying a set of decision-making rules. Finally, a grey relational analysis technique is employed to specify an appropriate weighting of the selected stocks such that the portfolio’s rate of return is maximized.

- Chen, Leung and Daouk [17] propose application of neural networks to an emerging financial market: forecasting and trading the Taiwan Stock Index. This model predicts the direction of return on market index of the Taiwan Stock Exchange, one of the fastest growing financial exchanges in developing Asian countries. Probabilistic neural network (PNN) is used to forecast the direction of index return after it is trained by historical data. Statistical performance of the PNN forecasts are measured and compared with that of the generalized methods of moments (GMM) with Kalman filter. Moreover, the forecasts are applied to various index trading strategies, of which the performances are compared with those generated by the buy-and-hold strategy as well as the investment strategies guided by forecasts estimated by the random walk model and the parametric GMM models.

- Connor, Niall and Madden [18] propose a neural network approach to predicting stock exchange movements using external factors. In this substantial dataset has been compiled with daily values of the DJIA, derived technical indicators, and external indicators and profit-based evaluation procedure for financial prediction systems is proposed, based on simulations with a simple trading strategy, it is more meaningful than evaluating systems based on the error between predicted and actual values, as is sometimes done. A neural network approach is shown to be successful in predicting movements of the DJIA, provided that external factors are considered. These results may be used as a baseline against which to compare other prediction techniques in the future.

- Yang, Min and Lin [19] propose the application of fuzzy neural networks in stock price forecasting based on Genetic Algorithm discovering fuzzy rules. This paper provides a method to improve black box model considering problems existed in its application. The improvement is achieved mainly by applying GA (Genetic Algorithm) in fuzzy systems to discover rules, eliminate errors or invalid rules caused by noisy data, and thus form valid sets of rules. Evaluation of the rule sets, as that of the whole prediction model, is performed through known knowledge and theories. At last, fuzzy reasoning approach is used based on the rule sets to predict price trend of stock market.

**Conclusion**

Although there are various techniques implemented for the prediction of stock market. Here in this paper a complete survey of all the stock market prediction techniques are given. On the basis of existing technique used for the future prediction of stock market a new technique for the prediction is proposed which provides close prediction of stock market.
References:


