

Prediction of stock price behavior with artificial neural network: A review of literature

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Abstract

Forecasting stock price index movement is an important financial problem that is receiving increasing attention. Prediction in stock market has been an important research topic for many years. Artificial neural networks has the ability to learn and model non-linear and complex relationships which is really important because in real life many of the relationship between input and output are non-linear as well as complex. At present artificial neural network has been widely used in stock predictions, economic management, pattern recognition, control and decision making, health and medical community, agriculture and many other fields. This paper represents a review of literature in prediction of stock price behavior with artificial neural network and from this literature found that artificial neural network is an effective tool for stock market prediction and high degree of accuracy.

Key words: Prediction, artificial neural network, accuracy, stock market

Introduction

The securities market is the market for equity, debt and derivatives. The debt market in turn may be divided into three parts i.e the government securities market, the corporate debt market, and the money market. The derivative market, in turn may be divided into two parts i.e options market and the future market. Except the derivatives market, each markets has two components i.e. primary market and the secondary market. The market where new securities are issued is called the primary market and the market where outstanding securities are traded is called the secondary market.

Prediction in stock market has been a hot research topic for many years. Stock market prediction is regarded as a challenging task of the financial time series prediction process since the stock market is essentially dynamic, nonlinear, complicated, and non-parametric in nature. Stock market is affected by many macro economical factors such as political events, general economic conditions, investor's expectations etc (Bharambe & Dharmadikari,2015). Indian stock market achieved a new milestone with BSE,s market capitalization crossing Rs.150 lakh crore for the first time in 2017. Bombay stock exchange is the oldest stock exchange in Asia. It was established as "the native share & stock brokers association" in 1875. BSE is the first stock exchange in the country which obtained permanent recognition (in 1956) from the government of India under the securities contracts(regulation) act 1956. According to listed company BSE is the world number one stock exchange and world number 5th in transaction(Dase & Pawar,2010). In stock market index in India, the Bombay Stock Exchange sensitive index, popularly called the Sensex, reflects the movement of 30 sensitive shares from specified and non-specified groups. It came to existence January 1, 1986.

Artificial Neural Network

We memorize something our brain stores the information. We can store information in computer as well both brain and computer can store information but their mechanisms are very different. In computer the information is store at a specific location. Where brain alters the association of neurons to store information. The neuron itself has no storage capability. It just transmits signals from one neuron to another neuron. We can call the

brain a gigantic network of neurons and the association of the neurons from specific information. Predicting the stock market is not a simple task. Different techniques are being used in the trading community for prediction task. In recent years the new concept neural network has been emerged. In 1943 W.S. Mcculloch and W.Pitts established neural network. The concept of artificial neural network was derived from biological neural networks. In last few year application of neural network in stock market forecasting has been increased. At present artificial neural network has been widely used in stock predictions, economic management, pattern recognition, control and decision making, health and medical community, agriculture and many other fields.

Predicting stock market return is a central issue in the field of finance, engineering, mathematics, economy and science due to its potential finance gains. Neural network may be one of the best approaches to predict the nature of stock market (Kara & Bogacioglu & Baykan,2011). There are several distinguished features that promulgate the use of neural network as a preferred technique over other traditional models of prediction. Neural network can be used for prediction with various levels of success. The advantage of then includes automatic learning of dependencies only from measured data without any need to add further information such as type of dependency like with the regression.

Literature review

Budhani(2012) tried to predicting the stock market and find out stock price depends on several known and unknown factors. To measure the performance feed forward neural network trained by back propagation algorithm has been used. The study concluded that back propagation algorithm is the best algorithm to be used in feed forward neural network because it reduces on error between the actual output and desired output in a gradient descent manner.Simon(2012) examined the stock market prediction. In this paper, different ANN models that have been experimented in SMP with the special enhancement technique used with them to improve the accuracy. The study concluded that ANN plays an important role in stock market prediction and accuracy.Chaudhury(2017) examined the stock market data are highly time variant and are more normally in a non-linear pattern. in stock market Pre predicting the future price is highly challenging. Many different techniques like technical analysis, fundamental analysis, time series analysis etc are used to predict the price but non of these are provided sufficient result. The result indicated that ANN is an effective tool for stock market prediction and high degree of accuracy.Bharambe(2015) Investigated stock market analysis best on artificial neural network with big data.This study found that artificial neural network improves the accuracy and efficiency of forecasting the stock market.Kara(2011) attempted to develop two efficient models and compare their performances in predicting the direction of Movement in daily Istanbul Stock Exchange(ISE) National index. The study is based on two techniques i.e Artificial Neural Network and Support Vector Machine. Experimental results showed that average performance of ANN model 75.74% was found significantly better than that SVM model (71.52%). Rodriguez(2000) Investigated the profitability of a simple technical trading rules based of ANN. The study based on general index of the Madrid stock market. it concluded that the buy and hold strategy generates higher returns than the trading Rule based on ANN only for a “bull” market.Dutta(2006)examined the stock price index in the Bombay Stock Exchange with artificial neural network. The author studied the weekly closing values of Sensex for 250 trading weeks starting from January 1997. ANNs models the root square mean error (RMSE) and mean absolute error (MAE) are chosen as indicator of performance of networks. They concluded that ANN models that can be predict the securities prices with higher levels of accuracy.Dase(2010) used artificial neural network for stock market prediction. This study find that predicting stock market index with traditional time series analysis has proven to be difficult on ANN may be suitable for the task. The result found that artificial neural network is very useful for predicting world stock markets. Kumar(2012) shows that ANN method are mostly implemented and play a vital role in decision making for stock market predicting.In this study the sample is selected 508 trading day in NSE

stock exchange study for a period of November 2009 to December 2011. multilayer perceptron architecture with back propagation algorithm has the ability to predict with greater accuracy than other network algorithms. The entire results suggested that ANN software predict stock price more accurately as compare other tools. Vaisla (2010) Analysed the performance of ANN technique for stock market forecasting during the period 1st April 2005 to 30th March 2007. The evolution technique i.e neural network and statistical technique were used. ANN forecasting models daily data 500 observations were used to future movement of forecasting accuracy. They concluded that neural network can be used as a better alternative technique for forecasting the daily stock market prices. Bharambe (2016) analysed the stock market prediction with big data. Genetic algorithm (GA), support vector machines (SVM), and artificial neural network (ANN) models used for stock market prediction. They used multilayer perceptron neural network. They examined that neural network provide various benefit such as accuracy, noise tolerance independent from prior assumption, easy to maintenance and problem tolerance. The entire study concluded that artificial intelligence as one of the best solutions for improving the limitations. Kim (2000) evaluated the genetic algorithms approach to features discretization and the determination of connection weight for artificial neural network to predict the stock price index. Technical indicators and the direction of change in the daily Korea Stock price index were used for data. The total number of samples is 2928 trading days from January 1989 to December 1998. They concluded that genetic algorithms are employed not only to improve the learning algorithm, but also to reduce the complexity in feature space. Experimental results show that GA approach to the feature discretization model outperforms the other models. Guresen (2011) highlighted the effectiveness of neural network models. In this study the models analyzed are multi-layer perceptron, dynamic artificial neural network, and the hybrid neural networks. The comparison for each model is done in to two view points: mean square error (MSE) and mean absolute deviate (MAD) using NASDAQ stock exchange index. The entire study result shows that ANN model MLP outperforms DAN and GARCH-MLP with a little difference. Finally they concluded that simple MLP seems to be the best and practical ANN architecture.

Conclusion

Predicting the stock market is very difficult task since it depends on several known and unknown factors. There are many methods like technical analysis, financial analysis, time series analysis and statistical analysis etc. are all used to attempt to predict stock market price but at present time they are not sufficient method for prediction share price. Artificial neural network (ANN), a field of Artificial intelligence (AI) is a new, active and promising technique which identifies unknown and hidden patterns data in share market. Successful prediction of stock price may promise attractive benefits for investors if neural network use for stock market prediction than it will give best outcome for investor. In entire study, we concluded that artificial neural network is very useful for predicting stock markets.

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