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Shaping Young Minds with Skill Oriented & Value Based Education



**Synopsis (Session 2017-18) on**

**“Stock Market Prediction Using Soft Computing Techniques"**

**Group No: 10**

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**STOCK MARKET PREDICTION USING SOFT COMPUTING TECHNIQUES**

SUBMITTED IN PARTIAL FULFILLMENT FOR THE REQUIREMENT OF THE AWARD OF DEGREE OF

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**Abstract**

As long as capital markets have existed, investors have strived to gain edges in predicting stock prices. In particular, use of soft-computing techniques and quantitative analysis to make stock predictions has become increasingly popular with time. These markets are affected by many uncertainties and interrelated economic and political factors at both local and global levels; determining the set of relevant factors for making accurate predictions is a complicated task. The proposed study aims to predict prices on stock exchange via the hybrid artificial neural network models and metaheuristic algorithms which consist of cuckoo search, improved cuckoo search, improved cuckoo search genetic algorithm, genetic algorithm, and particle swarm optimization. Daily market prices and financial technical indicators are utilized as inputs to predict the one day future closing price of individual stocks. The proposed technique reduces the potential for overfitting and overtraining, improving the prediction quality and generalization of the network. The result of the proposed model may suggest a dominant metaheuristic approach to predict stock price.

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1. **Introduction**

Stock price prediction has recently garnered significant interest among investors and professional analysts. The prediction of stock market trends is very complex, owing to the inherent noisy environment and high volatility related to daily market trends. The complexity of the market and stock price movement is related to a number of factors including political events, market news, quarterly earnings reports, and conflicting trading behaviour. Traders oftenrely on technical indicators based on stock data that can be collected on a daily basis. Despite the availability of these indicators, it is often difficult to predict daily to weekly trends in the market.

Generally, fundamental and technical analyses are the main concepts for economic strategies used in stock trading. Fundamental analysis focuses on evaluation of the proper prices of stocks and the expected returns from those stocks [1, 2]. The analysis is generally based on the factors affecting stock prices. Such factors may be related to the economic environment, industry environment and company circumstances. By using these factors to estimate the proper prices of stocks, investors consider buying stocks when their market prices are lower than their proper prices and they consider selling when the situation is reversed. In economic environments, both global and domestic economic factors can influence stock prices [2]. Obviously, the exchange rate, a global economic factor, affects the stock prices of import or export companies [2]. Foreign financial markets also can be a global economic factor. Since countries are linked together, movement on one stock market may have an impact on other stock markets.

Technical analysis studies the history of stocks and changes in of stock prices and volume to find predictable patterns, or future trends of stock prices, to make investment decisions [4]. Although in general stock prices are sensitive to fundamental factors, some investors believe that, if for a certain period a stock market has sluggish responses to change of fundamental factors, they might be able to identify trends in stock prices during that period [2]. A guideline for most technical analysis is the Dow Theory [2]. This theory considers three trends of stock prices: the primary trend, secondary or intermediate trend, and tertiary or minor trend [2]. The primary trend is the movement of stock prices over long periods of time, several months or years [2]. The intermediate trend is the movement of stock prices over several weeks or months, lasting shorter than primary trends [1]. The minor trend represents the movement of stock prices during a day, which has little significance in stock trends [1,2]. Besides the Dow Theory, moving averages are also used to predict stock prices [2]. For example, comparing a moving average of stock prices over the past several months with the current price of the stock, if the stock price is higher, then the stock price might be expected to fall [2].

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1. **Motivation**

The fluctuation of stock market is violent and there are many complicated financial indicators. However, the advancement in technology, provides an opportunity to gain steady fortune from stock market and also can help experts to find out the most informative indicators to make better predictions. The prediction of the market value is of paramount importance to help in maximizing the profit of stock option purchase while keeping the risk low.

To determine whether the stock market price of a firm remains fluctuating or stable.

Decipher trends on real time change in prices of stocks in companies.

Determine characteristics and analysis of stock price change in a given period of time.

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**3. Literature Review**

Many evolutionary and swarm based algorithms have been applied by the research community for improving the results of the stock market data. These algorithms are innovative and having intelligent paradigms to solve the optimization problems and provides better quality results over traditional methods.

**3.1 A Hybrid Artificial Neural Network with Metaheuristic Algorithms for Predicting Stock Price**

**By Rahim Ghasemieh, Reza Moghdani & ShibSankar Sana**

On critical analysis, we inferred particle swarm optimization is a dominant metaheuristic approach to predict stock price according to statistical performances of the traditional statistical approaches.

**3.2 Forecasting stock market indexes using principle component analysis and stochastic time effective neural networks**

**By Jie Wangn, Jun Wangn**

The approach of PCA (Principal component analysis) to extract the principal components from the input data, then integrate the STNN (Stochastic time effective function neural network) model to perform the ﬁnancial price series prediction.

**3.3 A Bayesian regularized artificial neural network for stock market Forecasting By Jonathan L. Ticknor**

In this paper a Bayesian regularized artificial neural network is proposed as a novel method to forecast financial market behaviour. The proposed technique reduces the potential for overfitting and overtraining, improving the prediction quality and generalization of the network. Experiments were performed with Microsoft Corp. and Goldman Sachs Group Inc. stock to determine the effectiveness of the model. The results indicate that the proposed model performs as well as the more advanced models without the need for preprocessing of data, seasonality testing, or cycle analysis.

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**3.4 A HMM-based adaptive fuzzy inference system for stock market forecasting Md. RafiulHassan , Kotagiri Ramamo hanarao , Joarder Kamruzzaman , Mustafizur Rahman b, M. Maruf Hossain**

This system checks and computes the parameter values and generates new fuzzy rules as required, in response to new observations for obtaining better performance. In addition, it can also identify the most appropriate fuzzy rule in the system that covers the new data; and thus requires to adapt the parameters of the corresponding rule only, while keeping the rest of the model unchanged. This intelligent adaptive behavior enables our adaptive fuzzy inference system (FIS) to outperform standard FISs. The experimental results demonstrate that this approach can predict a number of stock indices, e.g., Dow Jones Industrial (DJI) index, NASDAQ index, Standard and Poor500 (S&P500) index and few other indices from UK (FTSE100), Germany (DAX) , Australia (AORD) and Japan (NIKKEI) stock markets, accurately compared with other existing computational and statistical methods.

**3.5 A multi-factor and high-order stock forecast model based on Type-2 FTS using cuckoo search and self-adaptive harmony search**

**Wenyu Zhang ∗, Shixiong Zhang , Shuai Zhang , Dejian Yu , NingNing Huang**

This model is a multi-factor and high-order time series forecast model that the Type-2 fuzzy time series model by integrating several other factors. They first employ the cuckoo search algorithm instead of the conventional average method to partition the universe of discourse, and then proposed a novel self-adaptive harmony search algorithm to optimize the high-order weight. Furthermore, the Shanghai Stock Exchange Composite Index and Taiwan Stock Exchange Capitalization Weighted Stock Index were used to verify the better performance of the proposed method. Experimental results show that the proposed method outperforms other baseline methods.

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1. **Objective**

From the literature, it is observed that evolutionary algorithms provide better results in comparison to traditional algorithms. It is also observed that these algorithms are stuck in local optima and the performances of these algorithms are affected in terms of quality of solution and efficiency. Hence, based on the motivation outlined in previous section as well as limitations of the existing algorithms, the main objective of this study is as follows:

* To implement new optimization algorithm for the efficient prediction of Stock Market.
* To analyze new attribute so that it can be used in predicting the Market.

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**5. Planning of Work**

The monitoring of different activities will be done with the help of Gantt Chart. Following tasks would be performed during the whole project:

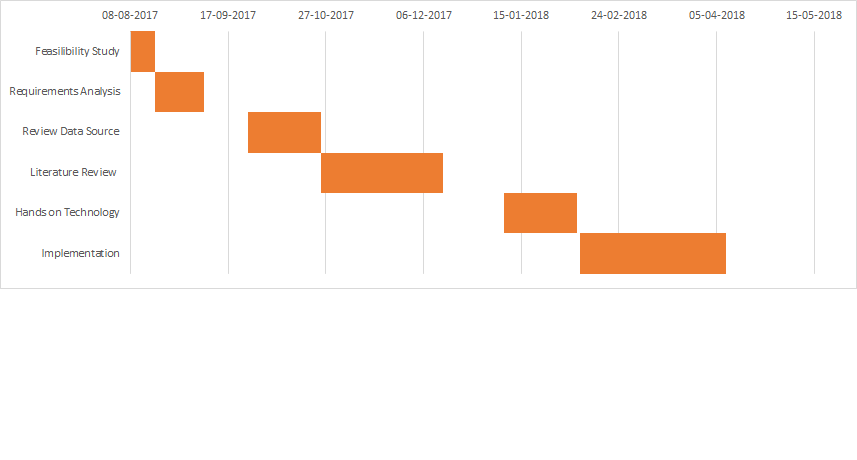


Fig 1. Gantt Chart

Methodology will include the steps to be followed to achieve the objective of the research during the research study. The whole year (August 2017- April 2018) project planning will be specified in the Gantt chart.

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