# Survey on Market Rate Prediction Based Algorithms

**M. Ranjani[1], Dr. P. R.Tamilselvi[2]**

Assistant Professor, Department of CS, Trinity College for Women, Namakkal, Tamil Nadu, India

Assistant Professor, Department of Computer Science, Govt Arts and Science College, Komarapalyam, Tamil Nadu, India

**Abstract:** *Financial exchange forecast has consistently grabbed the eye of numerous investigators and analysts. Well known hypotheses propose that securities exchanges are basically an irregular walk and it is a trick's down to attempt to foresee them. Foreseeing stock costs is a difficult issue in itself in light of the quantity of factors which are included. For the time being, the market carries on like a democratic machine however in the more extended term, it acts like a gauging machine and thus there is extension for anticipating the market developments for a more drawn out time allotment. Utilization of AI strategies and different calculations for stock value investigation and estimating is a zone that shows incredible guarantee. In this paper, we first overview a compact audit of financial exchanges and scientific categorization of securities exchange expectation techniques.*

**Keywords:** stock exchanges; stock markets; analysis; prediction; statistics

## 1. Introduction

Predicting stock and stock price index is difficult due to uncertainties involved. There are two sorts of investigation which financial specialists perform before putting resources into a stock.. First is the fundamental analysis. In this, financial specialists take a gander at characteristic estimation of stocks, execution of the business and economy, political climate etc. to decide whether to invest or not. On the other hand, technical analysis is the evaluation of stocks by means of studying statistics generated by market activity, such as past prices and volumes [1-2]. Specialized experts don't endeavor to quantify a security's inborn worth however rather utilize stock outlines to distinguish examples and patterns that may recommend how a stock will act later on. Efficient market hypothesis states that prices of stocks are informationally efficient; which means that it is possible to predict stock prices based on the trading data *(Malkiel and Fama)*. This is quite logical as many uncertain factors like political scenario of country, public image of the company, etc. will start reflecting in the stock prices. So, if the information obtained from stock prices is pre-processed efficiently and appropriate algorithms are applied, trend of stock or stock price index may be predicted. The domains of technical examination into notion, stream of-reserves, crude information, pattern, energy, volume, cycle, and unpredictability. Sentiment represents the behaviours of various market participants. Flow-of-funds is a type of indicator used to investigate the financial status of various investors to pre-evaluate their strength in terms of buying and selling stocks, then, corresponding strategies, such as short squeeze, can be adopted. Crude information incorporate stock value arrangement and value examples, for example, K-line graphs and bar charts. Trend and momentum are examples of price-based indicators, trend is used for tracing the stock price trends while momentum is used to evaluate the velocity of the price change what's more, judge whether a pattern inversion in stock cost is going to happen. Volume is an indicator that reflects the enthusiasm of both buyers and sellers for investing; it is also a basis for predicting stock price movements [5]. The cycle depends on the hypothesis that stock costs shift occasionally as a long cycle of more than 10 years containing short cycles of a few days or weeks. Finally, volatility is often used to investigate the fluctuation range of stock prices and to evaluate risk and identify the level of support and resistance. Conclusions can drive momentary market variances which thusly cause disengages between the cost and genuine estimation of an organization's offers yet over extensive stretches of time, be that as it may, the gauging machine kicks in as an organization's basics eventually cause the worth and market cost of its offers to combine. A prominent example comes from the Nobel Laureate Robert Shiller, who showed that stock prices are extremely volatile over the short term but somewhat predictable by their price-to-earnings over long periods. In the year 2000, rightly so, we witnessed the dotcom bubble burst.

Stock market price prediction is a tricky thing. A few speculations in regards to financial exchanges have been conceptualized throughout the years. They either attempt to clarify the idea of financial exchanges or attempt to clarify whether the markets can be beaten. One such popular and most debated theory given by Fama is the Efficient Market Hypothesis (EMH) which states that at any point in time, the market price of a stock incorporates all information about that stock [6-7]. In other words, the stock is accurately valued until something changes. There are three variants of EMH (i) the weak form which is consistent with the random walk hypothesis, and that stock prices move randomly while price changes are independent of one another thus, it is preposterous to expect to beat the market by winning anomalous returns on the basis of technical analysis; (ii) the semi-strong form which states that prices adjusted rapidly according to market and public information such as dividend, earnings announcements, and political or economic events, hence it is not possible to earn abnormal returns on the basis of fundamental analysis; and, finally, (iii) the strong form which states that prices reflect market, public, and private information as such no investor has monopolistic access to information [3-4].

## 2. Literature Survey

*1. Jingke Meng, Zibin Zheng, Guanhong Tao, Xuanzhe Liu [2016]* Proposed User-Specific Rating Prediction for Mobile Applications via Weight-based Matrix Factorization. Propose a model called Weight-based Matrix Factorization (WMF), which can capture user-specific interests and give a more accurate prediction on these apps. WMF views each user as a document and each app as a word, and calculates the weight of each app for target users. each user as a document and each app as a word, and calculate the importance of apps for target users to capture the specific interests of users. app weights denoting users' specific interests are introduced into the matrix factorization model to generate much more accurate rating prediction. if an instant messaging (IM) app and a game app have similar user ratings but with different numbers of users, then the game app with fewer users is more important for the target user as the IM app is installed almost by everyone which can barely show the specific interests of users. The game app, instead, presents the interest of users in a small specific group. Most of the previous work failed to capture such differentiation and consider all apps equally. Proposed method comparing with other state-of-the-art approaches. Large-scale experiments with approximate 5057 users and 4496 apps are conducted on a real-world dataset to study the efficiency.

*2. Manal Alghieth, Yingjie Yang, Francisco Chiclana [2016]* proposes a fractional adaptive mutation rate Elitism (GEPFAMR) technique to initiate a balance between varied mutation rates and between varied-fitness chromosomes, thereby improving prediction accuracy and fitness improvement rate. a novel GEP based GA methodology that utilizes a dynamic sliding-window architecture over well-known stock datasets to predict future stocks based on two conditions: 1) medium-term stock training conditions spanning durations of 2+ months and 2) short-term training-based prediction based on a week-long sliding window. The technique proposed to extends on existing GEP-based time-series prediction techniques by improving on the limitations of constant mutation rates via a proposed GEP-FAMR mechanism.

*3. Swagat Ranjit, Shruti Shrestha, Sital Subedi, Subarna Shakya [2018]:* Proposed foreign rate exchange prediction using neural network and sentiment analysis. There are various techniques and algorithms for prediction but different algorithms have different accuracy. Among them, one of the best and accurate methods is Artificial Neural Network (ANN). The FOREX market, whenever a trade is made, it is always buying one currency and selling the other. This is because currencies are always traded in pairs. The foreign exchange market is by far more complicated as compared to stock or bond markets. Predicting the foreign exchange rate includes predicting the performance of entire economies. Although there is no guaranteed FOREX prediction formula, many algorithms and AI techniques such as ANN, HMM, SVM, sentiment analysis has been applied to predict the exchange rate seeing the behavior and patterns of price within historical data.

*4. WANG Panpan, QIAN Qian, SHANG Zhenhong, LI Jingsong [2016]:* Proposed an improved recommendation method with weighted Slope one algorithm. Recommendation algorithms are mainly divided into four kinds: content-based algorithms, knowledge-based algorithms, collaborative filtering algorithms, and hybrid algorithms. Among these recommendation algorithms, collaborative filtering is one of the most widely used recommendation techniques, Slope one is a simple collaborative filtering algorithm, it is based on linear regression model and utilizes rating deviations to predict ungraded items. This algorithm receives much concern for its easy to understand and implement. However, Slope one algorithm is not better than traditional collaborative filtering algorithm when data is sparse, so this algorithm cannot resolve the data sparsity problem. Many improved Slope one algorithm has been proposed to obtain higher accuracy in recommendation. The above-mentioned studies are all based on the basic Slope one algorithm, and make prediction on the nearest items. But the users nearest neighbors are different; they have various preferences to the items. An improved Slope one algorithm is proposed, this algorithm is ground on user-based collaborative filtering algorithm. Specifically, the algorithm firstly calculates the user's nearest neighbors by the similarity between users, and then finds the appropriate number of neighbors based on user-based collaborative filtering.

*5. Arief Radityo, Qorib Munajat, Indra Budi [2017]:* Proposed to Prediction o fBitcoin Exchange Rate to American Dollar Using Artificial Neural Network Methods. Variety of ANN method to predict the market value of one of the most used cryptocurrency, Bitcoin. The ANN methods will be used to develop model to predict the close value of Bitcoin in the next day (next day prediction). ANN based prediction machine is not uncommon to be used in stocks and foreign exchange sector. Artificial Neural Network is inspired from the neural network of human body which consists of nodes and connections between them. ANN also has nodes and connections, the nodes are categorized as three types which are input, hidden, and output nodes. These nodes are connected by lines. Each of this connection has weights that are used to calculate the value from one node to the other. One of the most basic training method in ANN and has been proven to be accurate enough is backpropagation, Backpropagation Neural Network (BPNN) uses Multilayered Feed Forward Network structure. The structure consists of input neurons, hidden neurons and output neurons. These neurons are connected by an edge that has weights. Another method used to optimize the training process is genetic algorithm.

*6. Shuheng Wang, Binghao Chai [2016]:* Proposed a prediction model combined with an ARIMA (Auto regressive integrated moving average model) and a three layer artificial neural network. Propose a model with a three layer neural network implemented using inputs from an ARIMA process. The predictive power of the model on a time series of USD-EURO exchange rates. Three critical phases are involved in the construction of neural network for the purpose of training. The three layers consist of the input layer, hidden layer and the output layer. The interneuron connections have various strengths, also known as synaptic

weights, which will be iteratively calculated. The first and foremost process is the data collection whose objective is to obtain regularization in the frequency of the data for investigation. The relationship between the data components is studied and trained in the neural network and the output is used to predict the behavior of the exchange rates, data analysis and feature selection. Following the data collection phase, it is the data analysis which is used to select the data used to train ANN among those initially collected. This phase is crucial, because the learning capacity of the ANN depends on the quality of information provided. It involves whether this information provides a true representation of the phenomenon without producing ambiguous, distorting or amplifying effects in the phases of training networks.

*7. Bin Yang, Wei Zhang, Li-Na Gong, Huai-ZhiMa [2017]:* Proposed Finance Time Series Prediction Using Complex-valued Flexible Neural Tree Model. a novel time series prediction model based on complex-valued flexible neural tree model (CVFNT) is proposed. Compared with the fully connected complex-valued neural network, CVFNT model is more flexible and easier to approximate the unknown functions, and supports feature selection and over-layer connections. In a CVFNT model, input time series data, parameters and activation function are complex-valued. The structure of the CVFNT model is optimized by the improvement version of genetic programming (GP). Artificial bee colony (ABC) algorithm is selected to evolve the complex-valued (real and imaginary parts) and real-valued parameters in a CVFNT model. In order to evolve the structure of CVFNT model, structure based evolutionary method is needed, such as genetic programming, gene expression programming. In this paper, a modified method based on genetic programming is proposed, which contains three variation operators: mutation, crossover and selection. Mutation could change the current neural trees using mutation operators. Crossover could exchange two neural trees from current population according to crossover probability.

### Market Prediction
Securities exchange expectation is the demonstration of attempting to decide the future estimation of an organization stock or other monetary instrument exchanged on a money related trade. The successful prediction of a stock's future price could yield significant profit. Prediction methodologies fall into three broad categories .These are: Fundamental Analysis, Technical Analysis (charting) and Technological Methods [8-10].

### Fundamental Analysis
Fundamental Analysts are concerned with the company that underlies the stock itself. They assess an organization's past exhibition just as the validity of its records. Numerous presentation proportions are made that guide the basic examiner with evaluating the legitimacy of a stock, such as the P/E ratio.

### Technical Analysis
Specialized investigators or chartists are not worried about any of the organization's essentials. They try to decide the future cost of a stock dependent on the (potential) trends of the past price (a form of time series analysis). Nearby the examples, factual methods are used, for example, the exponential moving normal (EMA).

### Technological Methods
With the coming of the advanced PC, securities exchange forecast has since moved into the innovative domain. The most conspicuous strategy includes the utilization of counterfeit neural systems (ANNs) and Genetic Algorithms. ANNs can be thought of as mathematical function approximates. Their value in stock market prediction is that if a (potentially non-linear) relationship exists, then it is possible to find such a relationship based on logical indicators, the correct network structure and a large enough dataset [11-14].

## 3. Conclusion

Financial markets provide a unique platform for trading and investing, where trades can be executed from any device that can connect to the Internet. With the advent of stock markets, people have the opportunity to have multiple avenues to make their investment grow. Not only that, but it also gave rise to different types of funds like mutual funds, hedge funds and index funds for people and institutions to invest money according to their risk appetite. Governments of most countries invest a part of their healthcare, employment, or retirement funds into stock markets to achieve better returns for everyone. Online trading services have already revolutionized the way people buy and sell stocks. The financial markets have evolved rapidly into a strong and interconnected global marketplace. These advancements bring forth new opportunities and the data science techniques offer many advantages, but they also pose a whole set of new challenges.

## References

[1] Jingke Meng, Zibin Zheng, Guanhong Tao, Xuanzhe Liu, " User-Specific Rating Prediction for Mobile Applications via Weight-based Matrix Factorization", 2016 IEEE International Conference on Web Services.

[2] Manal Alghieth, Yingjie Yang, Francisco Chiclana," Development of a Genetic Programming-based GA Methodology for the Prediction of Short-toMedium-term Stock Markets", c 2016 IEEE.

[3] Swagat Ranjit, Shruti Shrestha, Sital Subedi, Subarna Shakya," FOREIGN RATE EXCHANGE PREDICTION USING NEURAL NETWORK AND SENTIMENT ANALYSIS", ©2018 IEEE.

[4] WANG Panpan, QIAN Qian, SHANG Zhenhong, LI Jingsong," An Recommendation Algorithm Based on Weighted Slope One Algorithm and User-Based Collaborative Filtering", c 2016 IEEE.

[5] Arief Radityo, Qorib Munajat, Indra Budi, " Prediction of Bitcoin Exchange Rate to American Dollar Using Artificial Neural Network Methods", © 2017 IEEE.

[6] Shuheng Wang, Binghao Chai," Exchange rate prediction model analysis based on improved artificial neural network algorithm", @2016 IEEE.

[7] Bin Yang, Wei Zhang, Li-Na Gong, Huai-Zhi Ma, " Finance Time Series Prediction Using Complex-valued Flexible Neural Tree Model", ©2017 IEEE

[8] C. N. Babu and B. E. Reddy, "Selected Indian stock predictions using a hybrid ARIMA-GARCH model, " 2014 Int. Conf. Adv. Electron. Comput. Commun. ICAECC 2014, 2015.

[9] M. D. Shubhrata, D. Kaveri, T. Pranit, and S. Bhavana, "Stock Market Prediction and Analysis Using Naïve Bayes," Int. J. Recent Innov. Trends Comput. Commun., vol. 4, no.11, pp. 121–124, 2016.

[10] X. Ding, Y. Zhang, T. Liu, and J. Duan, "Deep Learning for Event-Driven Stock Prediction," no. Ijcai, pp. 2327–2333, 2015.

[11] K. A. Smith and J. N. D. Gupta, "Neural networks in business: Techniques and applications for the operations researcher, " Comput. Oper. Res., vol. 27, no. 11–12, pp.1023–1044, 2000.

[12] M. S. Babu, N. Geethanjali, and P. B. Satyanarayana, "Clustering Approach to Stock Market Prediction," vol. 1291, pp. 1281– 1291, 2012.

[13] A, Adebiyi, A. K, Charles, A. O, Marion, and O. O, Sunday, "Stock Price Prediction using Neural Network with Hybridized Market Indicators, " J. Emerg. Trends Comput. Inf. Sci., vol. 3, no. 1, pp. 1–9, 2012.

[14] S. Kayode, "Stock Trend Prediction Using Regression Analysis – A Data Mining Approach," ARPN J. Syst. Softw., vol. 1, no. 4, pp. 154–157, 2011.

[15] Sharma, D. Bhuriya, and U. Singh, "Survey of Stock Market Prediction Using Machine Learning Approach," pp. 506–509, 2017.