

A Comparative Study on Stock Market Prediction

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Abstract – The economic growth will play a vital role in the growth of the country. Stock exchanges providing the backbone to a modern nation's economic infrastructure. The stock market is the place where the shares of public enumerated company is traded. The major market is where companies float shares to the general public in an initial public offering (IPO) to raise capital. The prediction of stock market help us to invest wisely in the stock market. The stock market is predicted on the basis of fundamental analysis and technical analysis. They are different prediction methods like KNN, SVM, Artificial Neural Network, datamining, sentimental analysis and Fuzzy system etc. are there to predict the exchange of stocks. Here we are analyzing these method and make a survey to find the efficient stock market prediction model to predict the stock movement with higher accuracy.

investment. With help of ML one can visually or statistically gain knowledge on investment in stock market.

The machine learning is classified into three types, they are given below:

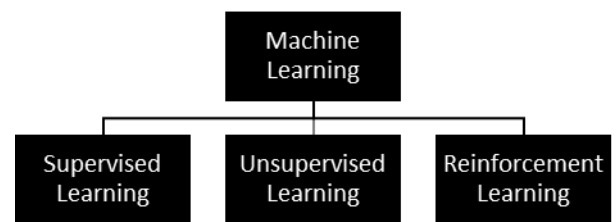


Fig 1: Classification of Machine Learning

Key Words: Traded, fundamental analysis, Technical analysis, exchanges of stocks, KNN, SVM, Artificial Neural Network, datamining, sentimental analysis and Fuzzy system

1. INTRODUCTION

The stock market refers to the collection of markets and exchanges where regular activities of buying, selling and issuances of share of publicly held companies take place. It is predicted on the basis of fundamental analysis and technical analysis. The stock market is susceptible to changes. These changes are caused by number of factors. The stock prices depend on varieties of factors they are: supply-demand, war, inflation, government's monetary policies, technology, natural disasters, corporate performance and government performance data etc.

1.1 Machine Learning

Machine learning (ML) is the application of application of Artificial Intelligence (AI) that provide system the ability to automatically learn and improve from experience without being explicitly programmed. In the field of finance ML has a greater impact. It has helped to choose the perfect investment from the stock market. ML is a catalyst to

In Supervised ML, There is a labelled input and labelled output. From the label the machine is able to understand what kind of output it would be based on the input. In Supervised ML there are two categories (1) Regression and (2) Classification.

(1)Regression predictive modelling is the task of approximating a mapping function (f) from input variable is a real-value, such as an integer or floating-point value. These are often quantities, such as amounts and sizes.

(2)Classification predictive modelling is the task of approximating a mapping function (f) from input variables (X) to discrete output variables (y).The output variables are often called labels or categories. The mapping function predicts the class or category for a given observation.

Unsupervised ML is a type of ML which uses clustering to train the machine. In Unsupervised ML, the output is labelled but the input is heterogeneous in nature.

Reinforcement ML is a type of ML which learns from experience .In this, the system is not given any label data it learns by itself by positive and negative feedback. A best example of reinforcement learning is a chat bot that learns from the user inputs and stores them to knowledge base.

2. Literature Survey

Several researcher have worked in the different model to predict the average movement of the shares in stock market. They developed an ample of strategies to help in the stock investment by predicting future values of stock market. They are several method are there to predict the movement of stock in the stock market and some of the examples are explained in below

Table -1: Sample Table format

Title	Advantage	Disadvantage
Support vector machine with adaptive parameters in financial time series forecasting [1]	SMV and RBFNN were observed to be better than BPNN and offer better performance.	Still need several improvement though prediction is satisfactory.
A fusion model of HMM, ANN, and GA for stock market forecasting [2]	It used the past dataset with additional information to predict the market performance.	The random market situation make the prediction of stock complex.
A neural network-based fuzzy time series model to improve forecasting [3]	Fuzzy relationship is used to predict the Taiwan stock index.	Getting too many input datasets is the main drawback.
Prediction of stock market index movement by ten data mining techniques [4]	LS-SVM and SVM combining together will give a better performance. SVM is better than LS-SVM, in-sample prediction, but in out-sample prediction LS-SVM is better than SVM in hit rate and error rate.	The huge amount of data require a huge processing time and also the result relies on the precision of the data.
Predictive analytics on	The market's	The various assessment

the public data-the case of stock markets [5]	pattern and the stock price is estimated in a better way.	examination applying effect as to be discrete.
Stock Exchange of Thailand index prediction using back propagation neural networks [6]	During the comparison between Adaptive Evolution Strategies technique and BPNN. BPNN is seen to be having the lesser forecast error.	The drawback is that it need Several improvements had to be made and BPNN had high forecast error during the (1+1) comparison between evolution strategy technology and BPNN.
Efficient Machine Learning Techniques for Stock Price Prediction [7]	With the stock chart it estimate the progressions in the stock price.	Numerous methodologies are used for prediction this leads to more time consumption efficiency in the result is also can be improved.
Predicting future trends in the stock market by decision tree rough-set based hybrid system with HHMM [8]	Better than stand-alone rough set based trend forecast method and hybrid decision tree- rough set based trend forecast method.	Massive time is needed to process the huge data and the precision is dependent on the data supplied.
A linear regression approach to prediction of stock market trading [9]	It provide a meticulous result from its relationship with the customer's behavioral method and its shopping cart by the composition of all the algorithm together. It discovers the linear relationship	The calculation using linear regression made it complex and reduce the accuracy level.

	between target value and one or more predictor using linear regression and hidden knowledge of data mining can predict the performance.	
Forecasting stock prices using financial data mining and Neural Network [10]	Recommendation of buying, selling or holding, etc. for stock trading is provided.	The complex in selecting datasets, the tedious trials and error process made the designing challenging.
MACHINE LEARNING APPROACH IN STOCK MARKET PREDICTION [11]	The Hybrid method substantially improve the overall forecasting accuracies.	It needs more data to be trained and hence the processing time of data is also high.
Prediction models for Indian stock market [12]	Monthly stock prediction are done by collecting news feeds and tweets	Daily stock prediction is not providing accurate result since we may not have news/tweets for a particular company many day or daily
Stock Market Prediction Using Data Mining [13]	It collect updated news from the news article that find the unknown pattern which helps to predict stock.	The huge historical data requiring, processing of information exactness of data is the drawback here.
Stock Price Prediction based on SSA and SVM [14]	It decompose the stock price in terms of trends, the market fluctuation, and the noise with	It still need more accuracy in the prediction

	different economic feature over different time horizon.	of stock price.
Stock Price Prediction Using Machine Learning [15]	Factors like open, close low, high and volume are considered. It incorporate various model to make the prediction easier and authentic.	The accuracy of the stock market prediction is reduced in terms of using the bigger datasets.

Support vector machine with adaptive parameters [1] deal with the application of financial time series forecasting. It used the five real futures contracts collated from the Chicago Mercantile Market as datasets. It increase the feasibility by comparing the result from SVM with the multilayer Back-Propagation (BP) neural network and Radial Basis Function (RBF). The adaptive Parameter are proposed by incorporating the financial datasets into the SVM. Though the prediction is satisfactory, it need the several improvements.

Fusion model of HMM, ANN, and GA [2] implement the cross platform by applying the combined model of Hidden Markov Model, Artificial Neural Networks, and Genetic Algorithms. It uses the trend prediction data as the datasets. Firstly the daily stock price data sets are passed to the Artificial Neural Networks (ANN) and its output is through Genetic Algorithms (GA) to optimize the input to the Hidden Markov Model (HMM).The output from the GA is passed as the input to the HMM. The price of every day and next day stock is predicted by finding the similar pattern in the history data using HMM. The drawback is that the random market situation make the prediction of stock complex.

Neural network-based fuzzy time series model [3] the operation of union is firstly used to combine inputs in the proposed method. The membership value are considered in the fuzzy time series model to forecast the stock market. The fuzzy relationship is used to predict the Taiwan stock index. The disadvantage of this model is getting too many input datasets.

Ten data mining techniques model [4] used ten different techniques of data mining to predict the stock price efficiently. It used Linear discriminant analysis (LDA), Quadratic discriminant analysis (QDA), K-nearest neighbor classification, Naive Bayes based on kernel estimation, Logit model, Tree based classification, neural network, Bayesian classification with Gaussian process, Support vector machine (SVM) and Least squares support vector machine (LS-SVM).The SVM and LS-SVM provide

better performance than other model. SVM is better than LS-SVM, in-sample prediction, but in out-sample prediction LS-SVM is better than SVM in hit rate and error rate.

Sentimental Analysis [5] collected the data from the online sources. The datasets are passed to the sentimental algorithm and it find the market's pattern and the stock price in the better way. The various assessment examination applying effect as to be discrete in this model.

Back propagation neural networks [6] used Thailand stock data, The Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI).here the Back Propagation Neural Network (BPNN) technology is used to predict the SET (Stock exchange of Thailand). BPNN achieved lower prediction error when compared with the Adaptive Evolution Strategies Technique. But it give higher prediction error when compared with the (1+1) Evolution Strategy.

Machine Learning Techniques [7] categorically classified different techniques like Time Series, Neural network, the de-noising technique, FFNN (Feed Forward Neural Network), LRNN (Layered Recurrent Neural Network), WsmPCA-NN and feed forward Neural Network. With the stock chart it estimate the progressions in the stock price. Numerous methodologies are used for prediction this leads to more time consumption efficiency in the result is also can be improved.

Decision tree rough-set based hybrid system with HHMM [8] predicts the trends in Bombay Exchange (BSESENSEX). It presents the hybrid system based on decision tree roughest with the combination of Hierarchical Hidden Markov Model. It is better than the stand-alone rough set based trends forecast method and hybrid decision tree rough set based trend forecast method. The disadvantage in this model is it needs the huge volume of data, and huge time is needed to process the large data and also the accuracy is depend on the data provided.

Linear Regression Approach [9] discovers the linear relationship between target value and one or more predictor using linear regression and hidden knowledge of data mining can predict the performance. It used clustering algorithms Weka software by utilizing K-means, farthest first linear regression and data mining. The datasets used here is EM samples of customers of an E-commerce website. It provide a meticulous result from its relationship with the customer's behavioral method and its shopping cart by

the composition of all the algorithm together. The disadvantage is this model is that the calculation using linear regression made it complex and reduce the accuracy level.

Financial Data Mining and Neural Network Model [10] used the Stock Data of Iran Teraktor Sazi Factory Data collection from Tabriz bourse website. It The advantage of this model is it provide recommendation of buying, selling or holding, etc. for stock trading. The complex in selecting datasets, the tedious trials and error process made the designing challenging.

MACHINE LEARNING APPROACH [11] combined the dataset and formed four set of feature list, when the data was split into train and test the number become very less that is noise which was removed from the dataset by using filtering techniques. Hence this model predict the outcome much better using SVM. And the test is conducted using non-linear RBF kernel. The advantage of this model is it takes more time.

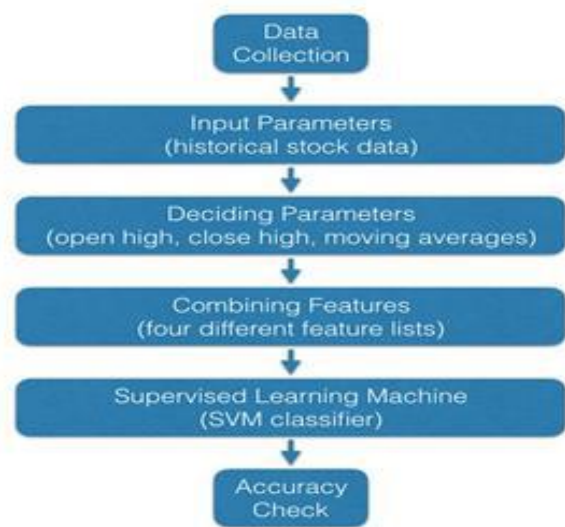


Fig 2: Architecture of the model [11]

Prediction models [12] incorporate multiple factors news, social media factor, historical price to increase the accuracy of the result, it built on the principle of technical theories two model was built here as part of business work. Supervised machine learning model is used to build the models. Here the history prices are combined with sentiments. The output of the model is based on the correctness of the input.

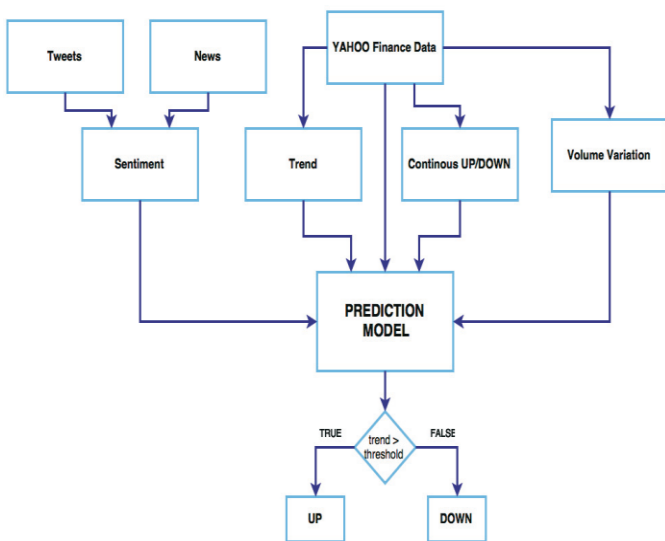


Fig.3: Prediction model for daily prediction model [12]

Data Mining [13] hold the essential memory for predicting the future direction. It helps in discovering the hidden patterns from the historic data, to measure the effect of real time news of stock the text mining approach is used. It predict the change of stock trend by analyzing the influence of non-quantifiable information. The accuracy of the result depend on the correctness of the input data.

SSA and SVM model [14] is used the Shanghai Stock Exchange (SSE) composite Index. It decompose the original stock index into the trend terms, the market fluctuation terms, the noise terms and time series with different economic features. The index value are passed as input to the SVM for prediction and SSA can better grasp the features of original index series than the EEMD, while the SSA-SVM combination have better predictive effect than that of the EEMD-SVM combination prediction.

Machine Learning model [15] was trained over the dataset taken from Yahoo Finance. It is using the LSTM and Regression based Machine Learning to predict the stock value. Here the prediction is depend on the large amount of history data of the stock market. LSDM regulate the error by giving an aid to the RNNs through retaining information for older stages making the prediction more accurate. The disadvantage of this model is that it is unable to provide the more accuracy in terms of bigger datasets.

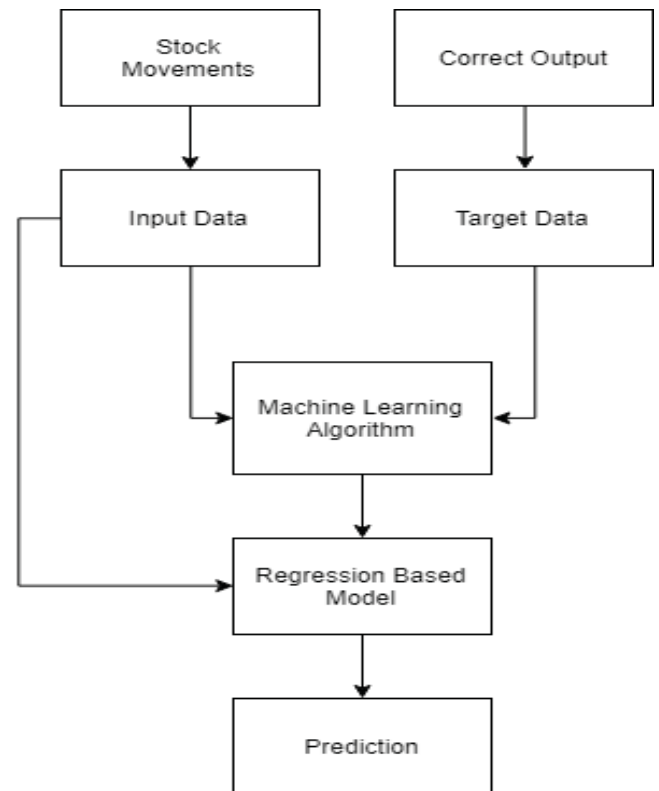


Fig.4: Flow Chart for Regression Based Model [14]

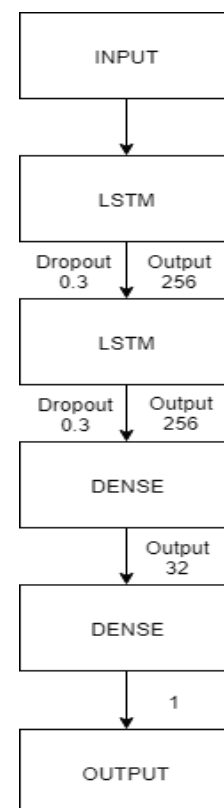


Fig.5: LSTM Layers [14]

3. CONCLUSION

In this survey paper the several researches behind prediction of stock market to determine the future prices of stock is discussed. Every model as considered the different technique to predict the stock movement effectively. But every method has its own pros and cons. The existing models are limited at the accuracy level and processing time and the exactness of data. Here we conclude that the movement of stock can be predicted with the development of model considering different factors, low processing time will be able to predict the stock movement efficiently.

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