Stock Price Prediction Using Regression Analysis

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Abstract: Stock price prediction has always attracted people interested in investing in share market and stock exchanges because of the direct financial benefits. It is also an important research topic in finance. Prediction of stock market returns is a very complex issue depends on so many factors such company financial status and national policy etc. These days stock prices are affected due to many reasons like company related news, political, social economical conditions and natural disasters.A lot of studies were performed for the prediction of stock index values as well as daily direction of change in the index. So many models were developed for predicting the future price of stocks but each one has its own short comings. Advanced intelligent techniques ranging from pure mathematical models and expert systems to neural networks have   also been used by financial institutions. In this paper we investigate to predict the stock prices using auto regressive model. The auto regression model is used because of its simplicity and wide acceptability. We have also conducted a study on the effectiveness of auto regressive model. The Moore and Penrose technique is used to estimate the coefficients of the regression equation. We have also studied accuracy of the prediction by comparing the predicted values with the actual values over a period of time.

Keywords: ***stock price, share market, regression analysis***

I.   INTRODUCTION:

Prediction of Stock market returns is an important issue and very complex in financial institutions. The prediction of   stock prices has always been a challenging task. It has been observed that the stock prices of any company do not necessarily only depend on the financial status of the company but also depends on socio economic situation of the country. It is no more directly linked with the economic development of the country or particular area. Thus the stock price prediction has become even more difficult today than before. These days stock prices are affected due to many reasons like company related news, political events natural disasters etc. stock price prediction is one of the most important issues to be investigated in academic and financial researches [1]. The fast data processing of these events with the help of improved technology and communication systems has caused the stock prices to fluctuate at a very rapid rate. A lot of studies were performed for the prediction of stock index values as well as the daily direction of change in the index. There are so many models to predict a price of a stock market. To invest money in the stock market we need to have an idea whether the prices of stocks are going to increase or decrease on the next couple of days. Several computing techniques need to be combined in order to predict the nature of the stock market. As the time elapsed, traditional capital market theory has been changed and various methods of financial analysis have been improved [2]. A lot of research has been taking place for many years in

forecasting the stock prices or stock index. It involves an assumption of fundamental information that is publicly available in the past that has some projecting relationships to the future stock returns or indices. The samples of such information include economic variables such as interest rates and exchange rates, industry specific information such as growth rates of industrial production and consumer price, and company specific information such as income statements and dividend yields. The value of the share depends on how many people want to buy it and how many people are selling it. If many people want to buy a stock, the price will go up. If there are more sellers than buyers, the price will go down. People usually buy/sell shares in stocks with the help of a broker. A broker also helps customers make good choices in stocks. Most brokers have recommendations for most of the stocks, based on the information about companies and what is expected from them. Various technical, fundamental and statistical indicators have been proposed and used with varying results. However, no one technique or combination of techniques has been successful enough to consistently beat the market. Traditionally, technical analysis approach [3, 4, 5 and 6], that predicts stock prices based on historical prices and volume, the Dow Theory, basic concepts of trends, price patterns and oscillators, is commonly used by stock investors to aid investment decisions. Advanced intelligent techniques ranging from pure mathematical models and expert systems [7, 8] to neural networks [9, 10, 11, 12, 13, 14 and 15] have also been used by many financial trading systems for stock prediction. Ultimately, most of the researchers have derived the various methodologies for predicting future share market prices using artificial neural network. In this project the future price of one stock is predicted based on its past day prices as well as other related present day prices. We have taken the stock data from New York Stock Exchange for our investigation. In this project we used the Auto Regressive Model to predict the future price of a stock.

II. RELATED STUDY

To predict the future market price of stocks many techniques have been proposed in the recent days. In these techniques they have used different types of methods and sometimes a combination of techniques to predict the future price of a stock market. Artificial neural network is a field of artificial intelligence where artificial neural network back propagation algorithm is used with the feed forward neural network to predict the price of a stock market. In [16] the author analyze and forecast the stock market index with Markov properties, stock prices as well as its state of interval in view of Markov model which provides investors with relevant reference model in order to avoid blind and irrational behavior. The main principle of using Markov chain to predict is to build Markov forecasting model that predicts the state of an object in a certain period of time in the future by virtue of probability vector of the initial state and state transition probability matrix. Markov process is a stochastic process with no after –effect properties. The after-effect properties mean: that state of at time t greater than s only depend on state of at the moment s in some process when the state is known at the moment s in some process, but not depend on state before the moment s in the process. Transition matrix is stated as, in a balanced system, (if the probability of the system from state i to j is P_{ij}), then the set of transition probability vector in the system state form a transfer matrix.

In [17] the author has introduced a new model for stock market price prediction. An HMM is a state machine for a system adherent to Markov process with unobserved states. Specifically regarding the time series analysis applications, if we denote the hidden state at time t as x(t) and the observation at the same time as y(t) then

the following facts are always true in the HMM: x(t) is dependent only on x(t-1), y(t) is dependent only on x(t). In the path to prediction, first there is a need to find the most similar day in stock market data for a specific day so that it could be used to predict the following day's close value. To do so first we need to compute the likelihood of previous days in the desired range. When having one day's stock data it is straight forward to compute the likelihood of that specific day from HMM. When the likelihood probabilities of different days are computed, the last phase would be to predict some day's close value as a target of this experiment. To do so they introduced a parameter likelihood tolerance denoting the similarity neighborhood that we can accept similar days to the previous day. Through using the likelihood tolerance we fetch a list of similar days to yesterday's stock data and then we try to find the best guess as the one that has the highest likelihood of all.

III. PROPOSED MODEL

This paper uses auto regressive model to predict the future price of a stock. If the output variable depends linearly on its previous values then it is called an auto regression. Auto regressive model define the current value of output variable as a linear combination of its own past values and present values of the input variables. The correlation technique finds the related stocks of the selected stock. The Moore and Penrose technique is used to estimate the coefficients of the regression equation. The auto regression model is a regression equation. The regression equation is solved to find the coefficients, by using those coefficients we predict the future price of a stock. Regression analysis is a statistical tool for investigating the relationship between a dependent or response variable and one or more independent variables. Initially we choose a stock exchange from a group of stock exchanges and then we select a stock from that stock exchange and its related stocks from the same stock exchange to retrieve their past values. Now we prepare the input data by using that historical data. In this model the input data is grouped into two sets as training data set and testing data set. The training data set is used to train a model and to estimate the unknown coefficients of the auto regression equation. These coefficients are estimated by using Moore and Penrose pseudo inverse technique. The estimated coefficients are used to predict the future price of a stock. Thus the coefficients are used to test the testing data set and the comparison is done between actual price and predicted price.

Implementation: We have implemented it using java. There are three modules. There are classes like Demo.java, MimoInterface.java, ModelBasedPrediction.java, Predictor.java, test.java, PredictorModel.java, InputData.java, PrictorOutput.java. We have a class PredictionModel.java, the following are the methods belongs to the class Prediction Model.

public PredictionModel(String outputParamName, String[] inputParamNames, int[] noOfTerms, int totalTrainSample, int totalTestSample)

public void makePrediction(InputData currentInput, PredictedOutput output)

private void doPrediction(PredictedOutput output)

private void updateTrainSample(InputData currentInputData)

In this way the auto regressive model is very useful in stock market price prediction. We have compared the predicted value of the share to the actual value for so many stocks. The graph showing the comparison between the actual value and predicted value is given in figure 1.
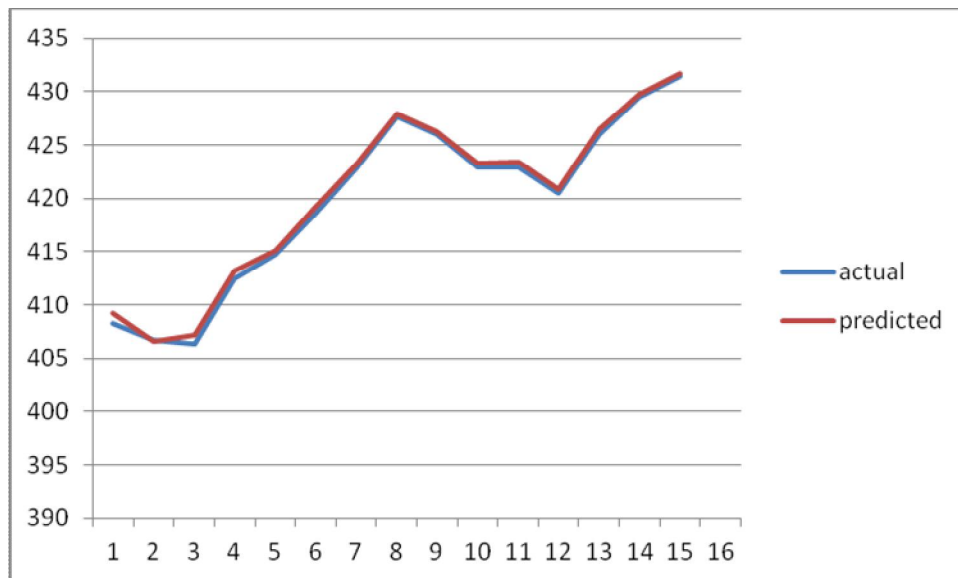

Fig 1: shows the comparison between the actual price and predicted price.

IV. CONCLUSION

Predicting the stock market price is very popular among investors as investors want to know the return that they will get for their investments. Traditionally the technical analysts and brokers used to predict the stock prices based on historical prices, volumes, price patterns and the basic trends. Today the stock price prediction has become very complex than before as stock prices are not only affected due to company's financial status but also due to socio economical condition of the country, political atmosphere and natural disasters etc. The return from the share market is always uncertain and ambiguity in nature hence traditional techniques will not give accurate prediction. A lot research has been made in this area and advanced intelligent techniques ranging from pure mathematical models and expert systems to neural networks have   also been proposed by many financial trading systems for stock price prediction. We uses auto regressive model to predict the future price of a stock. The model is very popular and we investigate in predicting the stock prices very accurately. We have shown the comparison between the predicted price and actual price in figure 1. As it clearly visible from the graph that, our prediction price is almost coincides with the actual stock price. This method of predicting the return on investment will help in a great way to financial institutions and stock brokers to predict the future price in such uncertain conditions.

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