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Stock Price Prediction And Analysis Using BPNN and ANFIS

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ABSTRACT: Stock Market is the market for security where organized trading of Stocks takes place either through exchange or over the counter in electrical or physical form. It plays an important role in canalizing capital from the investors to the business houses. As the stock prices get fluctuated every second it becomes very difficult to predict the stock price. Many have tried predicting the stock market, but very few have succeeded. It becomes difficult to guess or predict what would be stock price next second. We are implementing the prediction models of Artificial Neural Network (ANN) to predict the future stock price. The accuracy of models while predicting the stock price is tested with the real price which will be helpful for shareholder to predict the stock price of stocks.

KEYWORDS: BPNN (BACK PROPOGATION NEURAL NETWORK), ANN (ARTIFICIAL NEURAL NETWORK), ANFIS (ADAPATIVE NEURO FUZZY INFERENCE SYSTEM).

I. INTRODUCTION

Stock market prediction is the process of trying to predict the future value of a company stock or other financial instrument. The successful prediction of a stocks future price could yield significant profit. The stock price are highly unpredictable as they change every other second. Others disagree and those with this viewpoint possess myriad methods and technologies which purportedly allow them to gain future price information. This project is merely about the stock market. Nowadays there is increase in the number of daily dealing with the stock market. The stock price of any stock is fluctuating everysecond so it becomes very difficult for the stock dealer to predict about the price of any stock. Prediction of the stock prices will help such dealer to predict the stock price efficiently and make a proper decision about stock dealing. There are many models developed for predicting the stock price based on various different methods and technology. Also there are many hybrid models developed for better and more accurate prediction of the stock prices. Artificial Neural Networks (ANNs) are proposed as one of the most promising methods for predictions. The ANNs are inspired by the activity of human brain cells and can learn the data patterns and generalize their behavior to predict the future data. There are various existing model such as Back Propagation Neural Network (BPNN), Fuzzy Neural Network, Adaptive Neuro Fuzzy Inference System (ANFIS), Markov model etc. The two models i.e. BPNN and ANFIS will be trained which will help in predicting the future stock price. In order to study the behavior of the stock of the particular company, the graph of historical data is plotted. Thus this will help in predicting the future stock price efficiently and overcome the difficulties faced by the stockholders for predicting the accurate stock price.

II. RELATED WORK

[1] Stock market price prediction is done using various artificial neural network (ANN) where ANN is data mining technique that are learning capability of the human brain. ANN have been used for prediction of stock from long time. The prediction model, the implementation process, data collection is carried out in different steps. It uses the simple process and approach of carrying out the feed forward back propagation neural network. The performance of network was recorded and different error and value where studied for the prediction and working of the algorithm.

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[2] In these work, forecasting of stock price using fuzzy neural network is predicted. The genetic fuzzy neural network is used for the prediction of the stock price .The fuzzy logic works as the rule based development in artificial intelligence it can tolerate noisy information and train the network for predictions. The fuzzy network is combined with the genetic fuzzy neural network for overcoming the difficulties of fuzzy network and the predictions obtained are much better and higher results.

[3]A fuzzy inference system is combined into an ANFIS structure , to train a fuzzy system that intensifies its capability of dealing with nonlinearity and impression in addition to its implementation .In these logic the advantage is obtained when the large dataset is trained for input parameters .The results obtained to them where much higher and of better accurate prediction.

III. PROPOSED ALGORITHM

A.Artificial Neural Network(ANN):

Artificial neural network(ANN) is an information processing system that were inspired by generalizations of mathematical of human neurons .Artificial neural network are chosen for its ability to generalize results from unseen data ,for dynamic system for real time data. ANN's are parallel computational models comprised of densely interconnected adaptive processing units. These methods are fined grained parallel implementation model .ANN,s have ability to identify and learn correlated data patterns between input datasets and corresponding actual target values .ANN,s are networks of highly interconnected neural computing elements that have ability to respond to input and adapt to the environment by learning.ANN has two phases ,the phase of learning and the phase of recalling .In the phase of learning, known datasets are used as a training signal in input and output layers .The recall takes the input of the weight obtained in the learning phase .

B.Back Propagation Neural Network(BPNN):

Here in these paper we are using feed-forward back propagation algorithm for training the stock market company data and for predicting the stock value . The back propagation algorithm with multilayer feed forward for network prediction is used . Feed Forward back propagation has three layers of working as shown below in the figure 1:

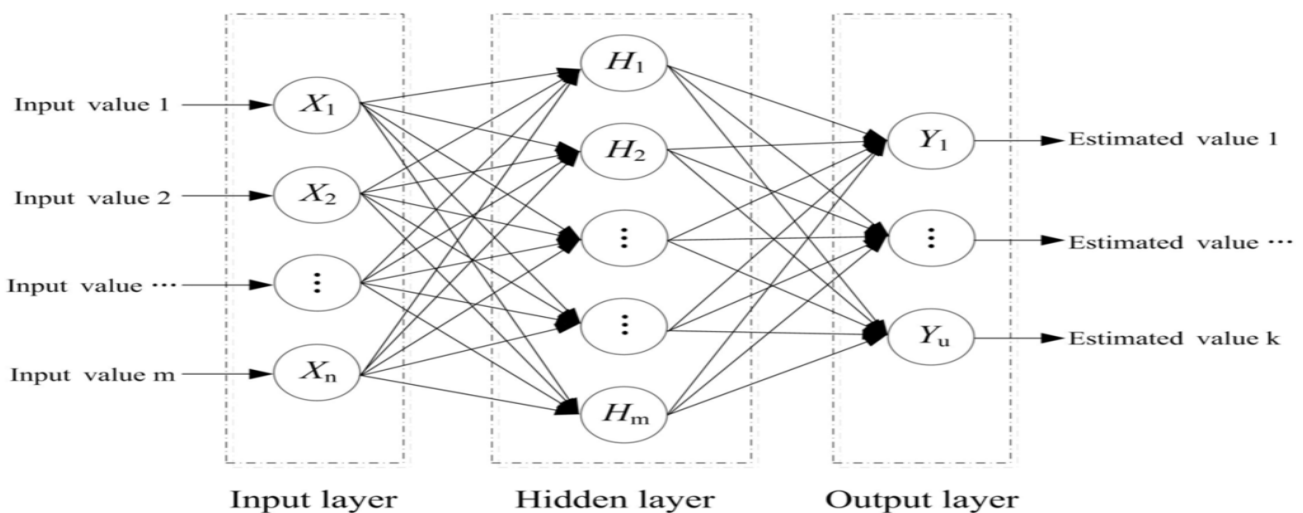


Figure1: Feed-forward back propagation architecture

As shown in above figure feed-forward back propagation architecture has three layers of neurons, where one is input layer , one hidden layer and one output layer is present. The training data is first taken by the input layer where the data is processed to the hidden layer neurons and the output layer is provided with the data where the output layer data

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id further again processed as the training data through hidden layers which gives the better prediction result and provides the much better values of prediction.

C.Fuzzy Neural Network:

Fuzzy neural network is an learning machine that uses the learning algorithm an fuzzy logic for finding the approximation of the fuzzy values.fuzzy logic uses an if-then rules for the training of the data sets .The if-then rules of fuzzy set are obtained through the key components of fuzzy inference system(FIS) that effectivelly models the human expertise in applications.The fuzzy lacks the adaptibility to deal with the changing external environment .

D.Adaptive Neuro Fuzzy Inference System(ANFIS):

As there are many difficulties in fuzzy neural network so here in our proposed system the adapative neuro fuzzy inference system is used that is the sugeno model is used for prediction of the data .The ANFIS architecture represent both the sugeno and Tsukamoto fuzzy models.In anfis model there are 2 inputs x and y and one output z based on which the if –then rules are developed.In ANFIS it gives the linear output .It works based on the linear equation.The architecture of anfis with 2 inputs and layers is as shown below in figure2:

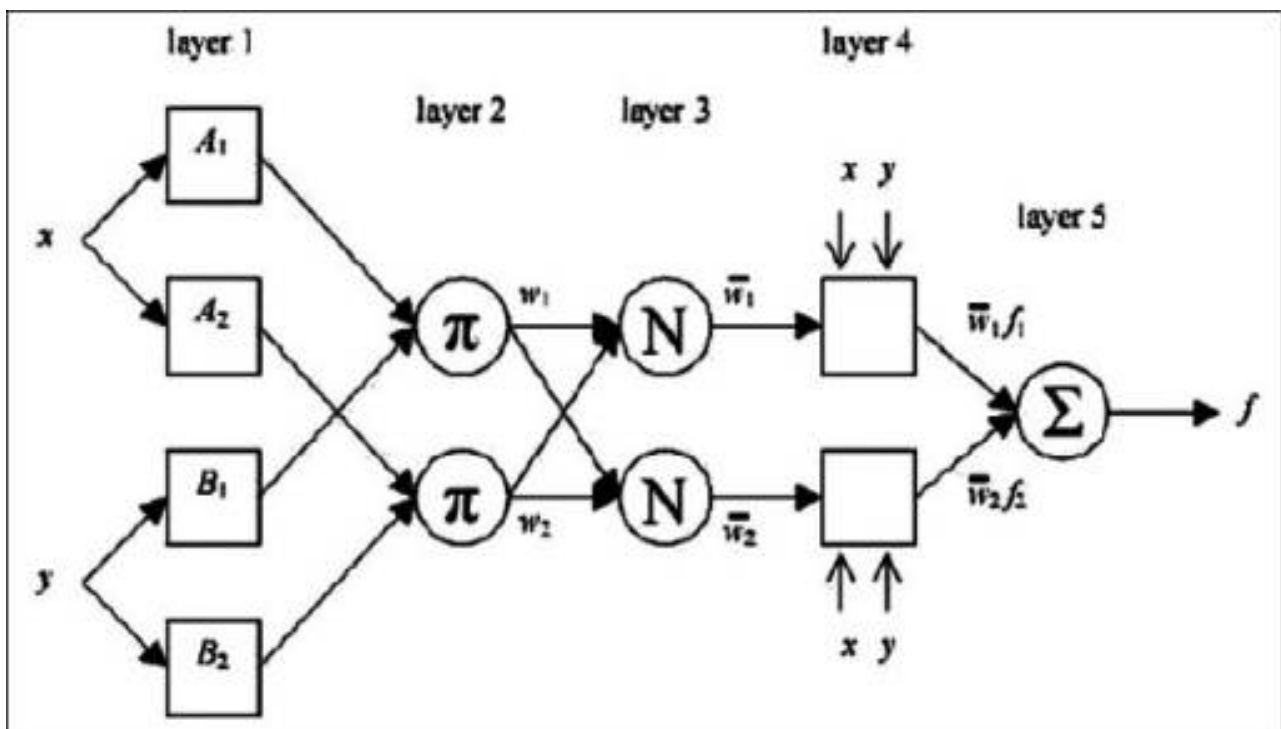


Figure 2.ANFIS Architecture

The if- then rules developed are as below:

Rule1:If x is A₁ and y is B₁ ,then $f_1=p_1x+q_1y+r_1$,

Rule2:If x is A₂ and y is B₂ ,then $f_2=p_2x+q_2y+r_2$,

and further more rules are developed similarly in the inference system.The output is obtained after processing of all the rules.



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IV. IMPLEMENTATION AND RESULTS

The implementation work is divided in the following steps

1. Training
2. Processing training data in algorithm for prediction
3. Comparison of the results

1. Training :

Training is the phase in the network of the algorithm where it is the learning phase. The data is given to the network where the network trains the data and learns the pattern of the data and historic values so that it can help in predicting the future price more appropriately. In these phase the weights and biases related to each neurons are updated so that it can help in getting the appropriate output value . There are many learning mechanisms that are used by models in the training phase .

1. Unsupervised learning:

Here the output of the network is not known ,the network learns by itself by processing the data and values obtained at different times .By learning from the historic values obtained after processing the data it trains the data.

2. Supervised Learning:

In supervised learning the output target is known by the network ,based on the output it has it trains the network and tries to predict the values .It compares the actual value with the output value calculates the error and then adjust the weights and biases accordingly to obtain the appropriate output value.

3. Reinforcement Learning :

It is similar to the supervised learning .The only difference is that in reinforcement learning it doesn't know the actual exact output value. Genetic algorithm generally uses the supervised learning method .The supervised learning is used by the algorithms used here.

2. Steps used in Algorithm Results:

Step1: Network initialization. Set the network connection weights and neuron threshold initial values in the range (-1,1).

Step2. Randomly select an input sample and the corresponding desired output.

Step3. Calculate the input in neuron of the hidden layer and then use hidden layer input and activation function to calculate the output of the hidden layer.

Step4. Calculate the input in neuron of the output layer and then use output and the activation function to calculate the output.

Step5. Use the desired output and the actual output and calculate the error.

Step6. Modify the connection weights and thresholds.

Step7. Calculate the error and again the desired outputs.

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The steps executed in the algorithm :

1.The intialization of weights and neurons

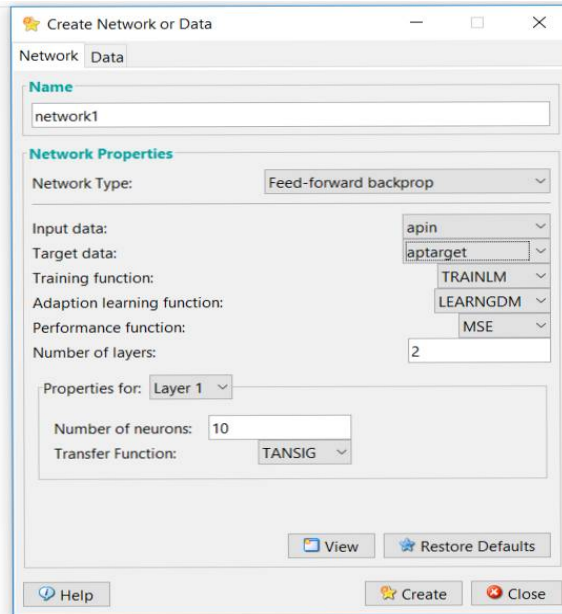


Figure 3: Intialization of network

2. Training of the network:

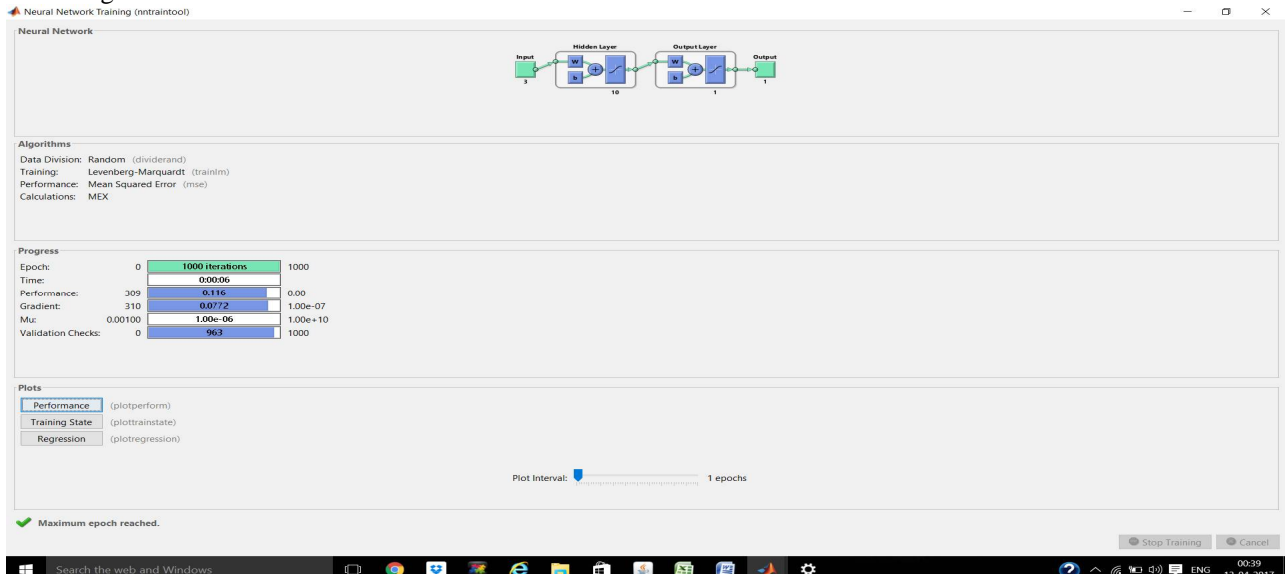


Figure 4: Training of network in BPNN

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ANFIS Steps:

1. Training :

The data is given for training process.

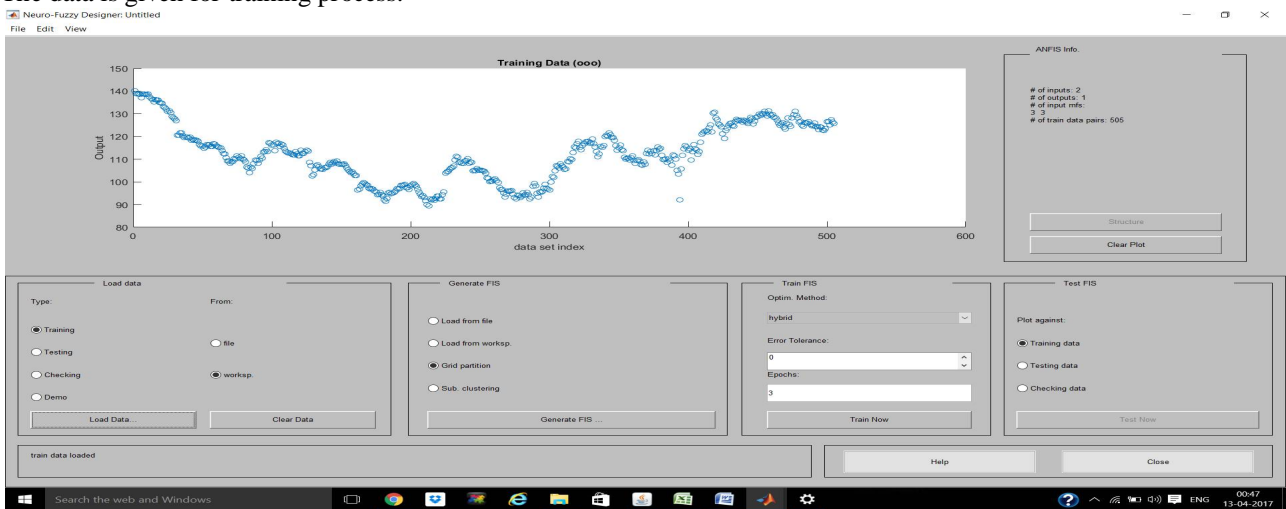


Figure 5 :training process of data

2. Checking:

The data is checked against the training data.

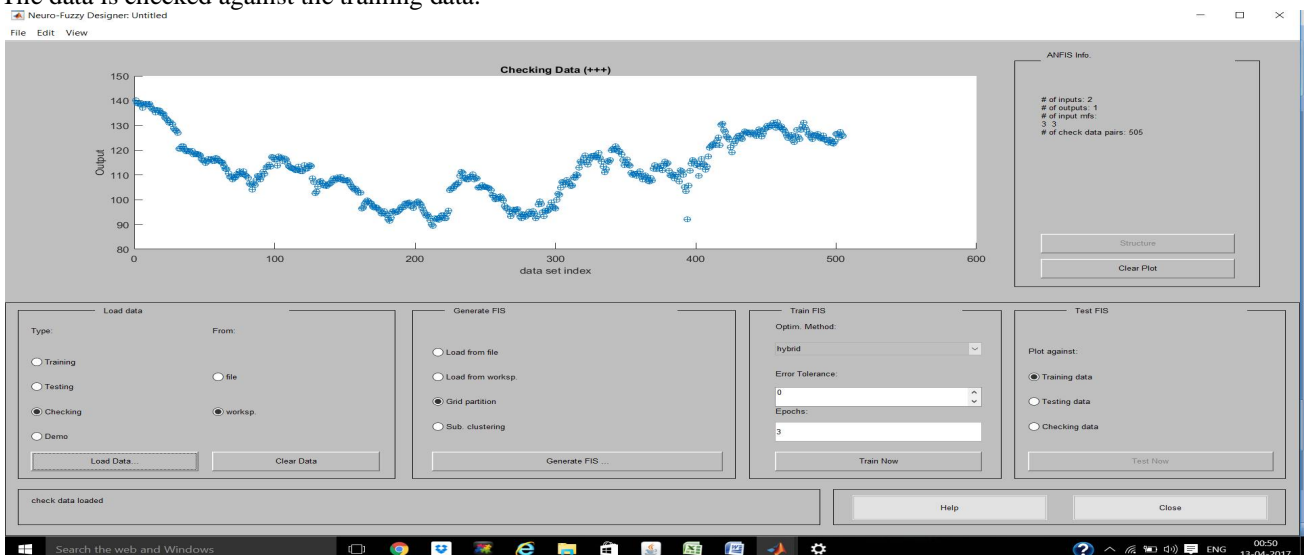


Figure 6 :Checking of data

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3.The clustering is done and data is again checked against the training data

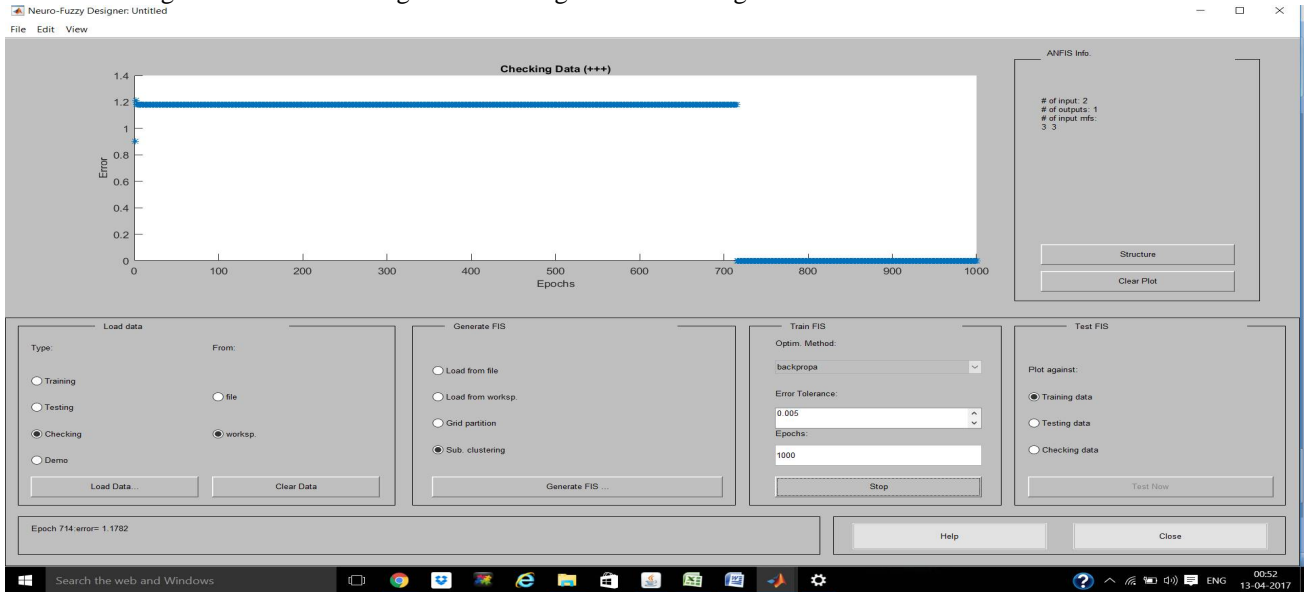


Figure 7:Clustering of data

4.After all the training process the output and the error value is obtained.

In our work ,the system is developed for the users dealing in stock market for the prediction of the future stock price.The simple UI is designed as follows for the users where users can use it to predict the stock price of any company .

The RSS feed is also updated and given which tells users about the current market.

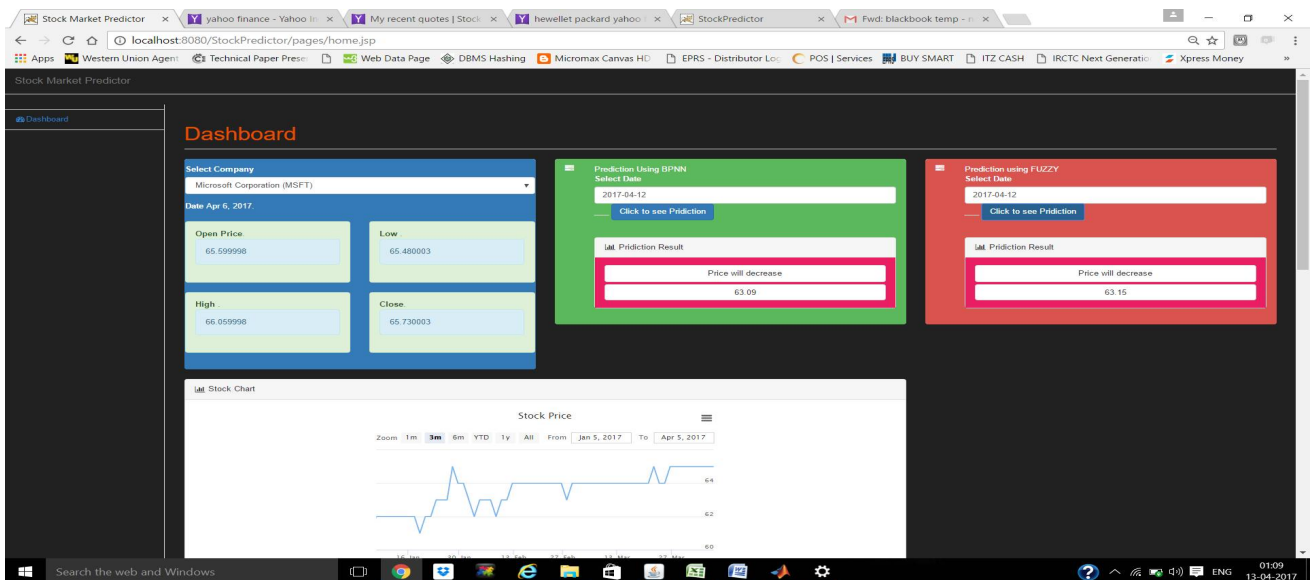


Figure 8:The UI design of implemented algorithm

The above figure shows the implementation of both the algorithm and the prediction results that are obtained.

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Comparison of Results:

The comparison of the prices obtained from different algorithm implemented is done and the analysis of the actual price with the prices predicted is done and the accuracy of algorithm is measured.

The result is analysed and compared using data of various different companies which is shown as in the below figure:

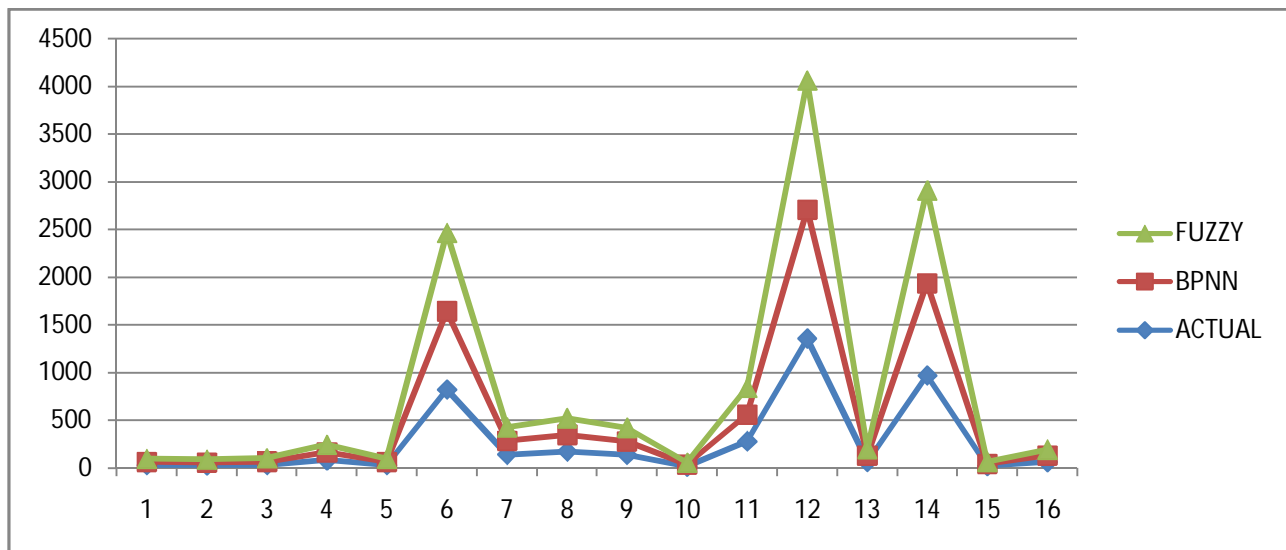


Figure 9: comparison of prices

V. CONCLUSION AND FUTURE WORK

Thus, the comparison between the values obtained from two algorithms is done which helps in deciding which model is more accurate for the prediction of the stock prices. After, the analysis of the results obtained it is seen that the BPNN is more accurate than the fuzzy model. The actual price is compared with the predicted price and observed that the model is accurate in predicting the price of the stocks. For Future the database can be obtained on real time bases ,the dead company details and information can be given to user .

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