# Stock Prediction Scrutiny using Artificial Neural Network

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*Abstract: This paper is based on the survey of neural networks in predicting stocks price in the market. The stock market prediction helps in identifying the investment decision before investing on different companies. Neural networks offer the capability to determine the outlines in the market prediction. Common stock market details and artificial neural network techniques are discussed. The study reports how neural networks leave behind the current techniques. The imminent ways for relating neural networks to the stock markets are discussed by forming survey table. Finally, future directions for applying the artificial neural networkto the stock markets are discussed.*

**Keywords:** *Stock Market, Artificial Neural Network (ANN), Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Predictions.*

## I. INTRODUCTION

Previous day's people traded stocks on perception. Neural networks are able to learn the mapping between input and output values of all nonlinear deterministic structure. Neural networks are trained to perform a financial data over traditional and other analysis methods.The enlargement of the neural network optimize the market's unknotted inscrutabilities. This paper is the survey of market's prediction techniques with a prominence on the need for the lacking in prediction of stock. Stock prices are predicted to determine the future value of the company's stock of any financial instruments that are marketed on stock exchanges. Predicting the stock market involves predicting the closing price of a company's stock for a given number of days.

## Necessity of prediction

People searched for a prediction method to increase the profit in stock. There are various stimuli for predicting the stock market values to gain money backing. The prediction system to be consistently pick the customer as winner would be the best system of prediction. The design of the greater prediction system is a beholding of many stockholders. None of the methods are proven to be the best prediction. Many of the techniques are used to progress raw data inputs to produce the output and that is used as neural network input.

## II. STOCK MARKET

Stock market prediction is the popular topic for the research. Even though more concepts and techniques are available there is a need for new and different analytical approach. The important thing is the result must depend on human experience and justification in the stock market prediction. We use an artificial neural network for the prediction because it has propagations of network for predicting suitable forecast of stock. Neural network offer the prediction of stock market more accurately by extracting knowledge from large set of data. Our research is to propose a neural network model for stock market forecasting. Our study focus on forming neurons for the architecture model. They include closing price, turnover, and interest rate as an input layer.

## III. ARTIFICIAL NEURAL NETWORK

An Artificial Neural Network (ANN) is a computation model that attempts to account for the parallel nature of the human brain. An ANN is a network of highly interconnecting processing neurons. ANN consist of several layers known as neurons. There are three major layers in ANN known as input, hidden, and output. All the layers are used for processing of data. The data fed to a neuron is known as input layer. The data processed in the neuron with the individual neuron in the input and then the output of the neurons are forwarded to the neurons in the hidden layer.

The value obtained has the input by the hidden layer are again processed within them and passed to either the output or the next hidden layer. In each link there is a parameter known as weight to represent the intensity of the link. With the help of weight modification the network can learn or train to map patterns in the input to the target value on the output. The procedure used for weight adaptation is called learning or training algorithm. This weight is known as bias unit or threshold present in the artificial neural network. ANN is good for the complex system, which underlies the process not completely disordered properties. By using ANN over conventional statistical method there is no need for underlying process of prior knowledge in ANN. In ANN, the existing complex relationship among various aspect is not recognized. In ANN, constraints and prior solution structure are not assumed and enforced. The general structure of ANN structure is described in the diagram 1.
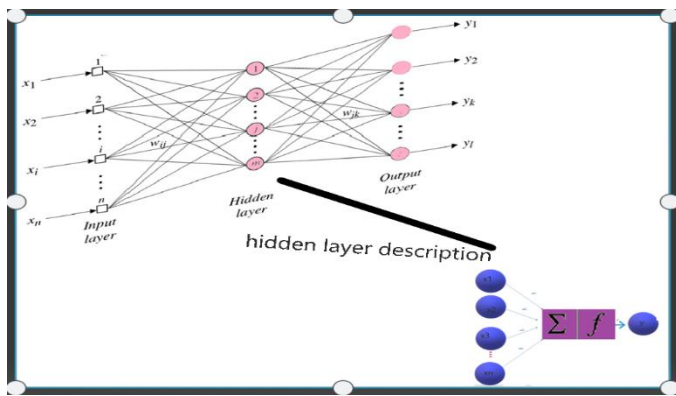


Diagram 1 General ANN structure with hidden layer description

### 3.1 Need for ANN in Stock Prediction

Every stock trading investor is looking for algorithmic trading strategy to get the prediction for making money in the stock market. The various ANN techniques and formulas are described in the Table 1.

Table 1 ANN techniques and formulas

| S N o. | ANN TECHNIQUES | DESCRIPTION | FORMULAS |
|---|---|---|---|
| 1. | Convolutional neural networks | It use the variation of multilayer perceptron designed to require minimal reprocessing. | $$n_{out} = \left\lfloor \frac{n_{in} + 2p - k}{s} \right\rfloor + 1$$ $n_{in}$: number of input features $n_{out}$: number of output features $k$: convolution kernel size $p$: convolution padding size $s$: convolution stride size |
| 2. | Recurrent Neural Networks | It is trained for sequence generation by processing real data sequences one step at a time and predicting what comes next. | Elman network: $h_t = \sigma_h(W_h x_t + U_h h_{t-1} + b_h)$ $y_t = \sigma_y(W_y h_t + b_y)$ Jordan network: $h_t = \sigma_h(W_h x_t + U_h y_{t-1} + b_h)$ $y_t = \sigma_y(W_y h_t + b_y)$ Variables and functions • $x_t$: input vector • $h_t$: hidden layer vector • $y_t$: output vector • $W$, $U$ and $b$: parameter matrices a • $\sigma_h$ and $\sigma_y$: Activation functions |
| 3. | Support Vector Machines (SVM) | It minimizes the upper bound on the expected risk. | $$f(x) = \omega \cdot \varphi(x) + b$$ |
| 4. | Neuro Fuzzy Model | It provides a method of models of reasoning such as common sense and uncertain process. | $$Z = \frac{W_1 \times f_1 + W_2 \times f_2}{W_1 + W_2}$$ |
| 5. | Multilayer Perceptron (MLP) | A subgroup of processing element is called a layer in the network. In this, the first layer is the input layer and the last layer is the output layer. Between the input and the output layer there may be additional layers of units are called hidden layers. | $$\vec{x} \mapsto f_{log}(w_0 + \langle \vec{w}, \vec{x} \rangle)$$ with $$f_{log}(z) = \frac{1}{1 + e^{-z}}$$ $f_{log}$ is called logistic function |

106

## IV. PROBLEM STATEMENT FOR STOCK PREDICTION

Day by day the stock values are changed depending upon the market condition. There are many regression and classification techniques available for stock prediction. The need is to provide best technique for better result in predicting the stock and give accurate pattern. From the table we analyzed there are different ANN techniques available to predict the stock. The comparison shows that there is a need for promising intelligent stock prediction methodology to predict the stock. There is also a need for new kernel function to give better performance with high accuracy and low rate of error.

## V. TRAINING SET FOR RNN AND MLP PREDICTION

Neural network has to be trained for particular data sets. The training includes determining the network environment and the algorithm. The major factor of neural network model is to defining what the network will learn. In the stock market the network goal is when one has to buy or sell the stock. The challenge is to gather historical data to form training data which is to be used as input. The input selection should be generalize the market performance with limited redundant data.Formulating the appropriate input is the major step in training the network. The next step is providing the input data which allows the network to learn accurately without overtraining. Training a network includes presenting input outlines. By forming the training set, the current stock system can be updated so as to detect newer trend and behave like real time stock prediction system.
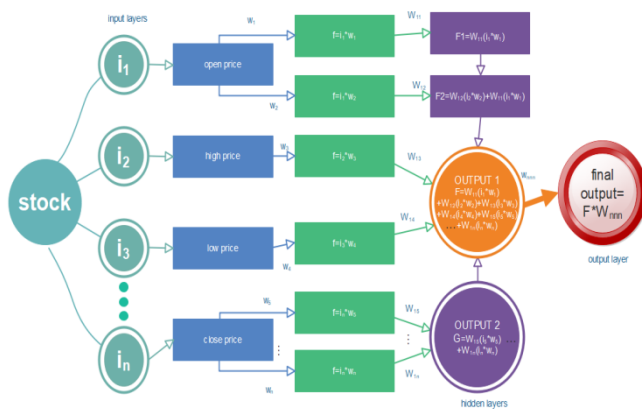


Diagram 2. RNN and MLP Fusion methodology structure

Neural networks are used to predict the stock market price to leave behind the market with vital goal of better return of the stock. This research work used to identify new hypothetical designs by examining numerous studies. When results are applied to complex problems like stock the training sets are formed to define the input layers-. The conviction of this study

is to determine the best prediction model for stock. This is described in the above Diagram 2.

## VI. CONCLUSION

There are various techniques implemented for the prediction of stock. This paper surveyed the application of neural networks in the stock market. It also analyzed some important stock market prediction techniques in ANN. This paper highlights the need for fusion model by merging the ANN techniques like RNN and MLP. Stock market is a multifarious and lively system and it is too complicated to recognize. Neural network will be theperfect prediction for the stock market because it capture nonlinearities in the system without the help of the human interferences.

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107

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