Design and Implementation of MCNN for Better Prediction of Stock Price Movement

Anshul Sahu

Indore, Madhya Pradesh, India

ABSTRACT

The stock market prediction is problematic subsequently the stock price is active in environment. To decrease the inappropriate predictions of the stock market and evolution the ability to predict the market actions. To escape the risk and the challenging in predicting stock price. Predicting stock market prices is a difficult task that conventionally contains extensive neural network. Owed to the linked environment of stock prices, conventional batch processing technique cannot be developed competently for stock market analysis. We propose an efficient Learning algorithm that develops a kind of Modified Computational Neural Networks (MCNN) based on BPNN (Back Propagation neural network) filter in training to increase the stock price prediction. Where the weights are adjusted for separate data points using stochastic gradient descent. This will distribute extra precise outcomes when linked to existing stock price prediction algorithms. The network is trained and evaluated for accurateness complete numerous sizes of data, and the results are organized.

Keywords : Predictive Analytics, Stock Index Prediction, Time Series Model.

I. INTRODUCTION

While most of the existing research in this domain were directed on approach to forecast stock price based on the historical numerical data such as past stock trends, there is not considerable research put interested in the textual analysis side of it. News and media has huge effect on human presences and the decisions we take. Correspondingly, fluctuations in the stock market are a consequence of the trading actions of human beings. As news articles impact our decisions and as our decisions impact the market, the news circuitously effect the stock market. Consequently, mining information from news trainings strength yield better consequences in predicting the stock prices. News understated stock trend forecast sentiment separation analysis expending a cohesion based method mining of text synchronized text and time series are specific of the illustrious works in the domain. In this research work, to assortment a reasonable study of stock predicting

algorithms and control the top predicting algorithm. The Linear Regression which contains additional than two predictor variables is Multiple Linear Regression. It activities the rapport between the two variables. The least square value is considered to find the prediction outcomes. The support vector machine is a supervised learning model to categorise the training data. The hyper-plane is recognised and the margin of the training data is maximized by Best Splitting hyper-plane. The support vectors which are neighbouring to the hyper-plane and it is in identical reserve from both the classes are recognised. The value of support vector is estimated by transmission the three weights to be learned after the SVM model. The Artificial Neural Network is a deep learning technique in hidden data neurons, to prediction the price of a stock. A Neural Network contains three layer one of the input layer next hidden layer last one is output layer. The weights are allocated for every input layer. The summation function is intended for the weighted output. The output layer computes the

sigmoid function aimed at the summation value. The concluding output is the predicted stock price. The prediction model forecasts regular prediction and continuing prediction. Sentiment Analysis is collective through a preeminent predicting algorithm to improve the consequences in the stock market. Hence the prediction model performances as a stock market agent in finance and business streams. Outstanding to the uncertainty, difficulty and non-linearity of the financial market data traditional statistical approaches were not effective sufficient to do investigates and predictions based on financial market data. So, the concentration has been shifted from linear models to non linear models with machine learning techniques comparable Artificial Neural Networks (ANN), Support Vector Machines (SVM), etc. Artificial Neural Networks (ANNs) is a branch of Artificial Intelligence (AI). ANNs contain of computational models and electronic circuits that pretend the functions of human central nervous system. Today ANNs are useful to numerous areas similar time series predictions, classification and pattern recognition, medical identifies and hardware device controlling, etc. Modeling financial market data is one of the major areas that ANNs are applied. Recurrent Neural Network (RNN) design and implementation of Modified Computational Neural Networks (MCNN) for improved prediction of stock price movement technique and to quantity the accurateness of the models established and classify the shortcomings of the models if present. Section II of this paper presents a review of research work related with this study. Section III designates the section the research methodology. Section IV discusses the results and section V concludes the paper.

II. RELATED WORK

This section will explain what Deep learning is and general algorithms used by previous researchers to predict stock prices. This will similarly afford a circumstantial of the technologies we procedure as part of this research. Deep Learning is a arena of Computer Science that provides Computers the capability to learn. The process of training a deep learning model includes providing an algorithm and the data so that model acquires its parameters from the providing training data.

Billah, M et al[1] numerous research works on stock prediction on dissimilar Stock Exchange trend, there are a identical litte works on Bangladesh perspective. [12] Worked on stock prediction of Dhaka Stock Exchange (DSE) expending neural network and ANFIS where ANFIS showed enhanced accuracy. By adapting training algorithm of neural network this presentation can be improved. Obtain enhanced performance then existing works. An better of Levenberg Marquardt training algorithm of neural network has been proposed. This better LM algorithm illustrations improved outcome than ANFIS. It similarly necessitates less computing time and assign less memory than traditional LM algorithm of neural network.

Peng Liu et al[2] regression technique of BP neural network technique and evaluation analysis of prediction accurateness, outcomes presented that BP neural network technique for forecasting accurateness than regression methods. BP neural network with RBF Neural networks neural networks to forecast the stock market share prices, lastly, three approaches of reasonable analysis of forecast accuracy. Investigational consequences presented that neural networks can be used to predict stock prices, though GABP network improved than BP network and RBF network prediction.

Gao, T et al[3] merging RNNs with helpful input variables can deliver a additional effective and consistent stock market forecast system. Besides, propose and authenticate a original stock closing price prediction model built on LSTM and stock basic

data. At last, foremost contributions can be connected to the streams successfully relate LSTM network, which is a furthermost prevalent structure of RNN, to scheme a stock prediction system. Study might support additional advances in financial time series analysis, particularly on how to usage RNNs for stock closing price forecast; correctly intended evaluation experiments are directed to assess the model. And a series of performance metrics are consumed to deliver an complete evaluation.

Motlagh, M. T. et al[4] Numerous engineering problems, such as portfolio optimization, peak power load and flood warning systems, which have a active structure, need a correct multi-step ahead prediction. In this research a technique for two-step fast prediction has been proposed, which could be lengthy for additional future time steps. For evaluation, two-step ahead forecasting by expending RNN network, NARX network and RTRL network were similarly achieved. The consequences accessible that the proposed network outperforms the aforesaid networks and yields a prediction through less error.
Abhishek, K et a[5] varieties use feed forward design for prediction. The network was trained expending one year data. It illustrations a respectable performance for market prediction. The network designated though was not capable to predict exact value but it prospered in prediction the leanings of stock market.

Tiwari, S., et al[6] This research involved the development of numerous approaches to discovery the furthermost precise model for prediction of prices of the stock. Improved the nodes of neural network as recommended by author of Stock Price Prediction and Trend Prediction Expending Neural Networks and became enhanced consequences. From the above listed approaches. Create that Feed Forward Neural network delivers the highest accurateness for the opening price of stock.

Chaigusin, S et al[7] This study considered the Thai stock market using feedforward backpropation neural networks. It intended to discovery appropriate neural network models for the prediction of the next day SET index by spread over seven time series, predictable to be the factors prompting the stock market, to the simulations created.

III. PROPOSED METHODOLOGY

Deep learning is part of a bigger family of machine learning technique based on learning data illustrations, as different to task precise algorithms. Deep learning models usage a cascade of multi layered non-linear processing units called as neurons, which can achieve feature extraction and revolution automatically. The network of such neurons is named an Computational Neural Networks. Computational Neural Networks are an instance for illustration of information in which the consequence is a nonlinear function of the input variables. Computational Neural Networks is an consistent group of nodes which simulate the construction of neurons existent in the human brain. These neurons are prepared in the form of successive layers, where productivity of the current layer of neurons is passed to the consecutive layer as the input. If the interconnections amongst the layers of neurons do not method a cycle, that neural network is named a Computational Neural Networks. In a Computational Neural Networks, each layer relates a utility on the previous layer's output. The hidden layer alters its inputs into approximately that output layer can usage and the output layer relates activations on its inputs for concluding predictions.
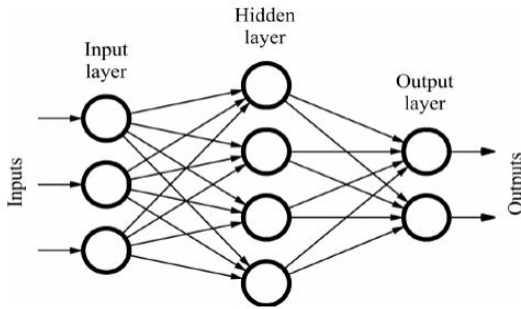
Figure 1 : Computational neural network

The preceding studies deliberated in Literature Review have working numerous important, technical and additional types of variables for model construction. Then in this study simply limited technical variables were measured as inputs. Above declared previous studies have working Computational Neural Networks with backpropagation, CNN with. In this study CNN, Modest architectures have been active. In previous studies quantity of input variables and quantity of neurons in hidden layers were diverse to discovery the greatest model. In this research work simply the quantity of hidden neurons was different while fixing the number of input variables to discovery the pre-eminent model. When allowing for the forecast error (or the assessment error) CNN models produce the maximum and the lowest errors. The predicting accuracy of the greatest feed forward networks is approximately 99%. CNN networks normally yield lower errors likened with Back propagation neural networks but in some occasions, the error is higher than Back propagation neural networks. Compared to other two networks, current networks are creating moderately higher forecasting errors. When allowing for the consequences of previous studies in maximum of the trainings recurrent neural network models produce the greatest consequences. But in this research MCNN models yield the preeminent consequences. This is because; in this research data of chosen for inputs. And there are variations of technical, important and other types of variables that can be used in emerging models. Predicts simply the

closing prices but reproductions can be developed to predict open,
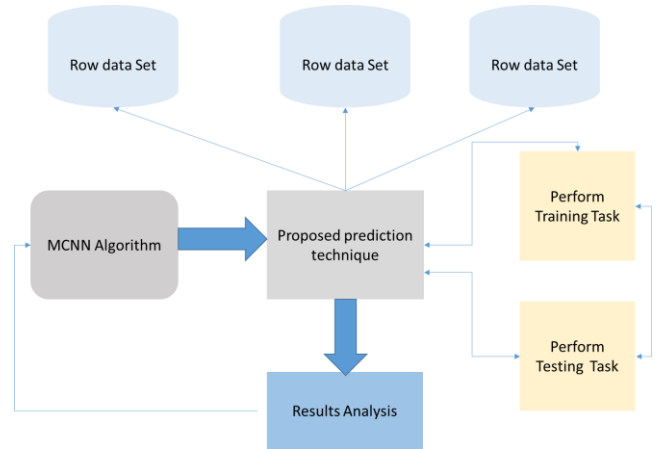
Figure 2 : Proposed prediction technique

The stock price is forecast in the prediction model by consuming the historical data and text opinion mining in social media data. The finance data comprises the historical data of of numerous companies. It is used for regular prediction. the reviews news which is articulated by every individual is assessed by the sentiment value. This data is used for everyday prediction. The Sentiment Analysis is combined with the preeminent forecasting algorithm. low, high prices, transaction capacities and reoccurrence on securities, etc.

IV. RESULTS ANALYSIS

We implement our algorithm on PC equipped with Intel Core i3 processor at 4 GB RAM, and conduct using java programming language on the window machine. MCNN have been trained with dissimilar amount of hidden nodes number and aimed at every node quantity dissimilar weights and bias were used at smallest ten times. Though, the greatest model in training phase is not essentially the greatest one in the testing phase. So averaging the presentation of ten-time running is complete to discovery out the error. Neurons in the hidden layer achieves improved. We evaluation our consequences with those of a

SVM model and an MCNN. The SVM model is trained usistochastic gradient descent since the dataset is too huge to use a bolted method solution. The CNN model usages a single hidden layer through 128 neurons with. The regularization parameter of the SVM was selected expending cross validation on a split after the training set. Subsequently both models are successive, we feed the concatenation of the previous 100 depth samples as input and we usage as prediction objective the price undertaking associated through the last depth sample. The proposed technique suggestively outperforms completely the additional assessed models on the accessible metrics, presentation that the convolutional neural network can improved handle the sequencial nature and improved govern the microstructure of the market in order to detect mid-price variations that happen Our algorithm performed with 76.5% F-score, appropriately classifying 76.5% instances. This means that the tool that deliver this model to the investor can suggestively benefit investor in his decision making by recommending him/her the stocks that are likely to achieve well. Algorithm still varieties mistakes and labels particular stocks that will perform well as the ones that will make severely and vice-versa. Conversely, to, this is state of the art performance for the extensive period impartiality price direction prediction.

V. CONCLUSION

The purpose of this study is to evaluation the performance of the prediction algorithms Support Vector Machine, MCNN in the stock market. The MCNN is less developed state which processes the relationship among the stock price and volume. The Support Vector Machine algorithm is a two-class classifier for the learning model. The MCNN is the classification algorithm for deep learning. The consequence exhibits that the deep learning algorithm performs improved than the SVM. In deep learning algorithm the hidden layer neuron learns in all prediction. Therefore the output layer neuron produces the greatest outcome. MCNN is the preeminent predicting algorithm.

VI. REFERENCES

1. Billah, M., Waheed, S., & Hanifa, A. (2016). Stock market prediction using an improved training algorithm of neural network. 2016 2nd International Conference on Electrical, Computer & Telecommunication Engineering (ICECTE). doi:10.1109/icecte.2016.7879611

2. Peng Liu, & Ying Ren. (2015). Bp neural network model for prediction of listing Corporation stock price of Qinghai province. 2015 International Conference on Logistics, Informatics and Service Sciences (LISS). doi:10.1109/liss.2015.7369738.

3. Gao, T., Chai, Y., & Liu, Y. (2017). Applying long short term momory neural networks for predicting stock closing price. 2017 8th IEEE International Conference on Software Engineering and Service Science (ICSESS). doi:10.1109/icsess.2017.8342981

4. Motlagh, M. T., & Khaloozadeh, H. (2016). A new architecture for modeling and prediction of dynamic systems using neural networks: Application in Tehran stock exchange. 2016 4th International Conference on Control, Instrumentation, and Automation (ICCIA). doi:10.1109/icciautom.2016.7483160.

5. Abhishek, K., Khairwa, A., Pratap, T., & Prakash, S. (2012). A stock market prediction model using Artificial Neural Network. 2012 Third International Conference on Computing, Communication and Networking Technologies (ICCCNT12). doi:10.1109/icccnt.2012.6396089.

6. Tiwari, S., Bharadwaj, A., & Gupta, S. (2017). Stock price prediction using data analytics. 2017 International Conference on Advances in Computing, Communication and Control (ICAC3). doi:10.1109/icac3.2017.8318783.

7. Chaigusin, S., Chirathamjaree, C., & Clayden, J. (2008). The Use of Neural Networks in the Prediction of the Stock Exchange of Thailand (SET) Index. 2008 International Conference on Computational Intelligence for Modelling Control & Automation. doi:10.1109/cimca.2008.83.

8. Zhao, Q., Zhao, X., & Duan, F. (2009). Prediction Model of Stock Prices Based on Correlative Analysis and Neural Networks. 2009 Second International Conference on Information and Computing Science. doi:10.1109/icic.2009.253.

9. Qeethara K. Al-Shayea, Member, IAENG," Neural Networks to Predict Stock Market Price" Proceedings of the World Congress on Engineering and Computer Science 2017 Vol I WCECS 2017, October 25-27, 2017, San Francisco, USA

10. Nivetha, R. Y., & Dhaya, C. (2017). Developing a Prediction Model for Stock Analysis. 2017 International Conference on Technical Advancements in Computers and Communications (ICTACC). doi:10.1109/ictacc.2017.11

11. M. F. Dixon, D. Klabjan, and J. H. Bang, "Classification-based financial markets prediction using deep neural networks," 2016.

12. L. Takeuchi and Y.-Y. A. Lee, "Applying deep learning to enhance momentum trading strategies in stocks," 2013.

13. R. Xiong, E. P. Nichols, and Y. Shen, "Deep learning stock volatility with google domestic trends," arXiv preprint arXiv:1512.04916, 2015.

14. A. N. Kercheval and Y. Zhang, "Modelling high-frequency limit order book dynamics with support vector machines," Quantitative Finance, vol. 15, no. 8, pp. 1315-1329, 2015.