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# Over view on stock predictor using machine learning and deep learning

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## ABSTRACT

***The trust which has grown in the power of deep learning models has made the finance industry very eager and with dynamical attitude to apply them in practice as it has been for the past few years. There are a variety of methods and techniques used which have remained very separate from each other in their approach. During the course of this survey, we intend to study the various techniques currently being used to predict or analyze the market and attempt to make a hybrid model so that a wider domain is covered in order to make better predictions.***

***Keywords***— *Neural Networks, Machine learning, Deep learning, Stock market prediction, Long short term memory cells*

## 1. INTRODUCTION

The very important and famous example of time series data is the Stock data and prices. In Order to tackle the problem of stock market prediction, traditionally, many different Classical macroeconomic and business methods. Human observation of patterns and corporate information are required by these methods. Convolution neural networks and deep multilayer perceptron are also widely used to deal with stock price prediction. Temporal memory is limited in these methods.

A number of technical analysis methods have been developed and are being used in stock market prediction. In order to predict the trend of future price changes, a technical index calculated from price sequence is used in technical analysis. Some neural network models are applied to predicting future price or rate of changes, and some are applied to identify specific price patterns that are characteristic of future price changes. In these models, however, quite little is considered about the learning method of neural network.

## 2. LITERATURE SURVEY

Ajit K R et al [1] has displayed estimating financial time series model utilizing a low multifaceted nature intermittent neural system and transformative learning approach. In the functional link artificial neural network, the concealed layers are wiped out by changing the input pattern to a high dimensional space utilizing a lot of polynomial or trigonometric premise capacities offerin to ascend to a less complex neural model. The point by point design and numerical displaying of various Fast Library for Approximate Nearest Neighbors (FLANNs) with trigonometric premise capacities have been depicted to anticipate the stock exchange return.

Amin HM [2] has proposed predicting the stock market using an artificial neural network. In this paper, numerous networks for National Association of Securities Dealers Automated Quotations (NASDAQ) list forecasting were created and approved for two information dataset( for example four earlier days and nine earlier days). Later, the upgraded organized structure for both sorts of dataset was chosen by their capacities in prediction. The model uses the values of the NASDAQ exchange price of last four and nine working days along with all days of the week as input parameters.

G. Peter Zhang [3] has proposed time series forecasting using the hybrid Auto-Regressive Integrated Moving Average (ARIMA) and neural network model. The most important and challenging task is to accomplish sensibly exact forecasts of time series. The two effective forecasting models are ARIMA and Artificial Neural Network (ANN). ARIMA is suitable for linear data generations function, while ANN is more suitable for non-linearly generated time series. The proposed word describes the hybrid forecasting method which applies ARIMA and ANN to linear and non-linear components respectively.

Yetis Y., Kaplan H [4] has proposed a stock prediction model using Artificial Neural Networks. The main aim is to find the best model for prediction of Istanbul Stock Exchange market values. In total, 8 sets of predictions that result from the application of six ANN models and two MA were performed. The results were compared by using the coefficients of determination for ANN models and mean relative percentage

 

errors for all the models. Based on the studies we can conclude that the prediction models based on ANNs were much exact than the ones based on MAs. We find that GFF network models were more appropriate for prediction among all the ANN models.

R. Roman J [5] informs us regarding Back propagation and Recurrent Neural Networks in financial analysis of different stock exchange returns. He proposed another technique to select between different stock exchanges for investing when the network being regularly utilized are not extremely precise. The new proposed strategy for structuring portfolios crosswise over international stock exchange prediction has demonstrated to be successful on genuine financial exchange information for five nations more than four years. The quality of this methodology is that it doesn't just rely on the exactness of forecasting of networks.

H Engjian Jia [6] in her paper has explored the effectiveness of long short term memory networks which were trained by backpropagation through time for stock price prediction. A wide scope of various architecture LSTM systems is developed, trained and tested in the paper.

Erkam G et al [7] proposed a model that evaluates the effectiveness of various neural networks. These are very effective as well as dynamic in the prediction of stock-market trends. Multi-Layer Perceptron (MLP), Dynamic Artificial Neural Network (DAN2) and the hybrid neural networks are the models that are analysed. These models use GARCH to obtain new input variables.

Hirotaka M et al [8] have presented a neural network model for technical analysis of the stock market. This model helps in buying and selling timing prediction for stock index.
Andrej K et al [9] has presented an analysis of representations, predictions and error types of LSTM, in order to put some light on performance and limitations of LSTM which are unknown at present.

Jian-Z W et al [10] have presented a new approach based on namely Wavelet De-noising based Back Propagation (WDBP) neural network model to predict the stock prices.

Shreelekshmy S et al [11] has proposed a technique to forecast the stock exchange prices using Long Short Term Memory, Recurrent Neural Networks, and CNN Sliding Window model. The proposed technique is a model-independent technique. It does not fit the data to a specified model, instead, it identifies the latent dependencies existing in the data using deep learning architectures.

Arun A et al [12] has presented a robust hybrid model of stock prediction. The proposed model is constituted of two linear models: auto regression moving average model, exponential smoothing model and non-linear model consist of a recurrent neural network. The goal is to increase the accuracy of prediction. The model is solved using a genetic algorithm.

Guoqiang Z et al [13] presents a state of art survey on ANN applications in forecasting. The purpose of the paper is to provide:
(a) Synthesis of published research in this area.
(b) Insights on ANN modelling issues.

The proposed work explains how Artificial Neural Networks has powerful pattern classification and pattern recognition capabilities along with the limits of what ANN's can learn from the data and make predictions.

J.B.Heaton et al [14] have proposed the use of deep learning hierarchical models for the problem in financial prediction. It applies deep learning method to the problem to solve and give the appropriate results. In this theory, deep learning can find the relationship of any data, no matter how complex and nonlinear.

Suraiya J et al [15] have presented a computational approach for stock market prediction. This paper investigates the stock market forecasting by using feed-forward neural network. ANN's has the capacity of obtaining useful information from the huge amount of data. Hence, they play a vital role in stock market prediction. This model has succeeded in forecasting the trends in the stock market with an accuracy of 100%.

Coskun H et al [16] has proposed a model that compares direct and iterative ANN forecasting approaches in multi-periodic time series forecasting. When performed using the direct or iterative method, the result of the method is compared using grey relational analysis to obtain a technique that gives good results.

**Table 1: Algorithms and methods used in Stock Prediction**

| Year | Author | Methodologies | Pros | Cons |
|---|---|---|---|---|
| 2017 | Sreelekshmy Selvin, Vinaya Kumar R, Gopalakrishnan EA, Vijay Krishna Menon, Soman KP[11] | Stock market forecasting using Long Short Term Memory, Recurrent Neural Networks and CNN sliding window model. | Applies sliding window technique to forecast the future values for a short period of time. | LSTM and RNN which are used in other time dependent data analysis are not performing better than CNN in the present case. |
| 2016 | J B Heaton, N G Polson, J H Witte[14] | Using deep learning technique to predict the financial data. | Helps to optimise prediction preferences in large data sets both practically and theoretically. | |
| 2016 | Moghaddam A H, Esfandiari M, Moghaddam M [2] | Stock exchange forecasting by using Artificial Neural Networks. | Predicts the trends in NASDAQ by using ANNs. | |
| 2016 | Hengjian Jia[6] | LSTM | Importance of last shown to remember the actions of the past. | Doesn't provide conflict analysis for the workflow. |
| 2016 | Andrej Karpathy, Justin Johnson, Li Fei-Fei[9] | The source of LSTM improvements. | LSTM improvements to long-range structural dependencies and provide | |

 

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|---|---|---|---|---|
| | | | analysis of the remaining errors. | |
| 2015 | Ajit Kumar Rout, P K Dash, Rajashree Dash[1] | Functional Link ANNs and recurrent CEFLANN Models. | Predicting financial time series using less complex Recurrent Neural Networks. | The recurrent CEFLANN shows very fewer variances. |
| 2014 | Akhter Mohiuddin, Arun Agarwal, V K Sastry[12] | RNN and a hybrid model to forecast the stock market returns. | It gives a new different time series data from the original time series data and also provides future forecasting in every sliding window. | It doesn't guarantee excellent prediction on active data sets |
| 2014 | Suraiya Jabin[15] | Stock Market Prediction using Feed-forward Artificial Neural Network. | It has the capacity to obtain useful information from huge data sets. | |
| 2014 | Yetis Y, Kaplan H, Jamshidi M[4] | ANN | The results were differentiated using the coefficients of determination models and using mean relative percentage error for all of the models. | |
| 2011 | Jian-Zhou Wang, Ju-Jie Wang, Zhe-George Zhang, Shu-Po Guo[10] | The used method is Wavelet De-noising based Back Propagation neural networks. | Handles general noisy stock exchange data and increases the accuracy of prediction. | Can use other easier methods for preprocessing and remove the noise. |
| 2011 | Erkam Guresen, Gulgun Kayakutlu , Tugrul U. Daim[7] | Analysis of Multilayer Perceptron(MLP), deep neural network(DANN), generalized autoregressive conditional heteroskedasticity(GARCH )model. | Clears the dominance of ANN new models such as DANN. | |
| 2009 | Coskun Hamzacebia, Diyar Akayb, Fevzi Kutayb[16] | Compares direct and iterative artificial neural network forecasting approaches in multi-periodic time series forecasts. | This helps in comparing the direct and iterative method. | It fails to draw a conclusion that the direct method gives better results for all the time series forecasting problems. |
| 2003 | G.Peter Zhang[3] | ARIMA, ANN | uses a hybrid ARIMA and neural network model to forecast the time series model. | ANN is most appropriate for nonlinearly produced time series. In this case, it is practically difficult to set up the exact nature of a series and a real-time series that frequently contains both linear and non-linear structures. |
| 1998 | Hirotaka Mizuno, Michitaka Kosaka, Hiroshi Yajima[8] | a neural network model for technical analysis | Helps to make a higher profit by generating signals for buying and selling stocks at more proper timings. | The model does not generate appropriate selling signals and the performance is 0.99(under1). |
| 1998 | Guoqiang Zhang, B Eddy Patuwo, Micheal Y Hu[13] | ANNs for forecasting. | They have great pattern classification and pattern recognition capabilities. | For a static linear process with less disturbance, they may not be better compared to linear statistical models. |
| 1996 | Roman J, Jameel A[5] | RNN and back propagation for financial analysis of stock data. | proposed a unique method to select between various stock markets for investing. | |

 

The table gives a detail survey of different algorithms and methods used as well as its advantages and disadvantages.

## 3. CONCLUSION

In a domain like Finance data plays quite an important role. We have done an extensive survey on stock market prediction. The algorithms and models used to predict the stock values has been tabulated. A number of algorithms have been used and yield promising results too. It should be interesting to see that the combination of which algorithms might lead to a probable least level of error and most accurate results.

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