

Trend analysis of stock market from historical data using hybrid neural network model

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Abstract—Stock market price prediction is a much explored topic in the recent years. Many factors determine change of stock price. Stock market is also a very complex and unorganized place as there are lots of data and information and there is confusion that which data to use and which to not. The stock market can also be very unstable and volatile as it is subject to change in a very short span of time. Traditional approaches used either neural network or time series analysis algorithm to predict the market trend. The problem with the traditional approach is that the trend generated by the neural network tends to linearize after a while and on the other hand time series analysis algorithms tend to generate a threshold or range rather than something concrete. This is why in this approach we tried to combine them to achieve better outcome.

Index Terms—RNN, FBProphet, time series, stock market, machine learning, regression.

I. INTRODUCTION

Stock market prediction is a very popular research topic. It is because, everyday new methods or models are being introduced and even though the improvement they bring over their predecessor is very small sometimes but it is very important. Stock market as mentioned before is a very volatile market, The market is subject to change due to many reasons. That is why the need of creating a prediction model is very high. This way the customers who do transaction in stock market can use this prediction or forecasting model to trade with minimized loss and maximum profit.

In the previous years many attempts and approaches are taken to forecast the stock market using various methods and models. For example: a very popular method is using the various financial news to predict stock market as the market depends on them [10]. Another approach is using the various stock market index and using regression or neural network to predict the future trend [3]. The problem with these approaches is that the trend tend to linearize after a certain period of time.

A linear line can hardly represent the trend of a stock market as we have previously mentioned that stock market is a very volatile place.

The presented paper will be used to forecast Bangladesh stock market trend. Historical data of Bangladesh stock market was used for training the model. We have collected approximately 2.5 years worth of historical data of Bangladesh stock market in our work. The test result will be cross checked with the actual value to find how the model works in real life.

In our work as mentioned before we have collected historical data of stock market and we will use those data to train a RNN LSTM model. We will also use the FBProphet algorithm on the data. This way we get a pattern from the LSTM and a data band from FBProphet. Then we will try to find a correlation between the band and the pattern so that we can use that co-relation to predict the future trend of the stock market.

The rest of the paper will be organized as follows. Section 2 contains some similar works from which we drew our inspiration for this work. Section 3 will contains a brief description of the experiment setup we will use, the various tools we will use and how we will configure those. Section 4 will contains the results of this work and comparison between different results we have generated. Section 5 will contain conclusion.

II. LITERATURE REVIEW

Stock prices depends on various factors such as economic factors, political factors, change of leadership and many more factors. So stock market has a nature of high volatility that is why it is not easy to predict. Most of the approaches of stock prediction is developed on technical and constitutional analysis of stocks. To predict stock price several models and methods have been developed in past years. Among them the artificial neural network (ANNs) model is very popular because of the

ability to learn patterns from data and derive a solution from unknown data. Ayodele, Aderemi and Charles [1] obtained data from New York Stock (NYSE) and Nigeria Stock Exchange (NSE) and used the autoregressive integrated moving average (ARIMA) models to predict the stock price. They used this model because it has a strong potential for short term prediction and for stock prediction it can compete beneficially with other existing prediction techniques. But they used only one model and it will not generate a very accurate output. In another work by Qun, Lingyu and Gaowei [13] they tried prediction of stock opening price by a robust time series learning model. The used sentimental analysis model with LSTM time series learning model for prediction of stock price. But they focused on news sources rather than previous data to detect the stock market but all news cannot be reliable. Saloni, Sahitya and Sudheer [6] gathered a big amount of time series data and by using deep learning models, tried to boost the accuracy of stock price by analyzing the data in relation to related news articles. They collected data-set which includes daily stock price of "S&P500" companies for five years with more than 265000 articles on fanatical news related to those companies. Then they used deep learning models like ARIMA, Facebook Prophet, RNN, LSTM and RNN LSTM Multivariate model on those data-set for predicting the stock price. But they used those models individually to predict rather than combining the algorithms with each other. Ping-Feng and Chih-Sheng [7] focused on forecasting stock price problems and proposed utilization of the unique strength of the ARIMA model and the SVM model using a hybrid methodology. Erkam, Gulgun and Tugrul [3] focused on some neural network models such as multi-layer perceptron (MLP), dynamic artificial neural network (DAN2) and the hybrid neural networks which use generalized auto-regressive conditional heteroscedasticity (GARCH) to extract new input variables. They stated that these models are known to be effective and dynamic in stock market predictions. So, they tried to evaluate the effectiveness of these models. In our work we used both FBProphet and LSTM model and combined them. After that we used gradient tree regressor to create a relation between true value and output of our combinational models. And then used that relation to predict the output of next 10 days which gives us more accurate result.

CONCLUSION

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