

Stock Market Price Prediction by LSTM & Linear Regression Algorithm using Machine Learning

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Abstract

In this project analyse existing and new methods of stock market prediction. Take three different approaches at the problem: Fundamental analysis, Technical Analysis, and the application of Machine Learning. Then find evidence in support of the weak form of the Efficient Market Hypothesis, that the historic price does not contain useful information but out of sample data may be predictive. It show that Fundamental Analysis and Machine Learning could be used to guide an investor's decisions. The demonstrate a common flaw in Technical Analysis methodology and show that it produces limited useful information. Based on algorithmic trading programs are developed.

I. INTRODUCTION

Investment in Stock is one of the most rated businesses for making money for middle class investors. After that it is actual trading business of high class investors and traders. Company's share price is most important point for investor which always fluctuates up and downwards

Eyes always need on live price of share market and instant decision making is necessary to prevent loss of money and eventually to gain money. For this you have to make study of the company's financial history and future agenda. Dependent on overall study related to market and company you can decide to invest. But you have limits to study because one cannot be sure about that study and analysis is correct.

Company's market history, tendency of maintaining business in any period or slack, policies and announcements are the key points of Stock Rate. It is difficult field of work and need lot of experience to be a successful investor.

Financial analysts who invest in stock markets usually are not aware of the stock market behavior. They are facing the problem of stock trading as they do not know which stocks to buy and which to sell in order to gain more profits. All these users know that the progress of the stock market depends a lot on relevant news and they have to deal daily with vast amount of information. They have to analyze all the news that appears on newspapers, magazines and other textual resources. But analysis of such amount of financial news and articles in order to extract useful knowledge exceeds human capabilities. Text mining techniques can help them automatically extracting the useful knowledge out of textual resources.

II. METHODOLOGIES

In this section, we focus on dataset being used for our experiments along with the machine learning mechanisms.

For implementation of the enhanced learning-based method – enhanced NN - for stock price prediction, the stock market data downloaded from the web will be processed first before they are used as inputs to the NN method.

After pre-processing of the stock market data, sentiment analysis of the news articles is performed by three different sentiment analysis methods, and a voting method is used to select the final sentiment scores.

III. LITERATURE REVIEW

1) Predicting Stock Market Price-A Logical Strategy using Deep Learning-Milon Biswas, Atanu Shome, Md. Ashraful Islam_ IEEE-2021 The objective is to predict the market performance with the help of an artificial neural network. The techniques of artificial neural networks classify the stock in mainly three categories that is buy, hold and sell, supported previous data. It's observed that the logistic regression model is employed by every individual to predict a stock in an exceedingly better way. Advantage of Machine learning for stock predictions can help financial institutes better manage their clients and make informed decisions to maximize their profits. Disadvantage of this reference is Due to the fluctuating nature of the stock its too difficult to predict

2) Short-term stock market price trend prediction using a comprehensive deep learning system Jingyi Shen and M. Omair Shafiq_Springer-2020 The objective is to predict the stock movement with good accuracy. The realm of interest is that the dataset of the stock prices from past years. The raw dataset must be preprocessed for data analysis. After pre-processing the information, we are going to use machine learning techniques like random forest and support vector machines on the dataset to come up with the outcomes. Advantage of this is the accurate prediction of stocks price movement will lead to more profit investors can make And disadvantage is Limited data pre-processing mechanisms built and used.

3) Stock Market Prediction Analysis by Incorporating Social and News Opinion and Sentiment Zhaoxia WANG, Seng-Beng HO, Zhiping LIN_ IEEE-2018 Forecasting the stock prices has always been a difficult task for the analysts. The investors are highly curious about the stock prediction. For a successful investment, many investors have an interest in knowing the long-run condition of the stock market. The prediction models for the stock market helps the investors and also the analysts by providing the long run information of the stock market. Recurrent neural networks (RNN) and Long Short-Term Memory (LSTM) is the machine learning approaches used for stock price prediction

Linear regression is easier to implement, interpret & efficient to train. Linear regression is quite sensitive to outliers.

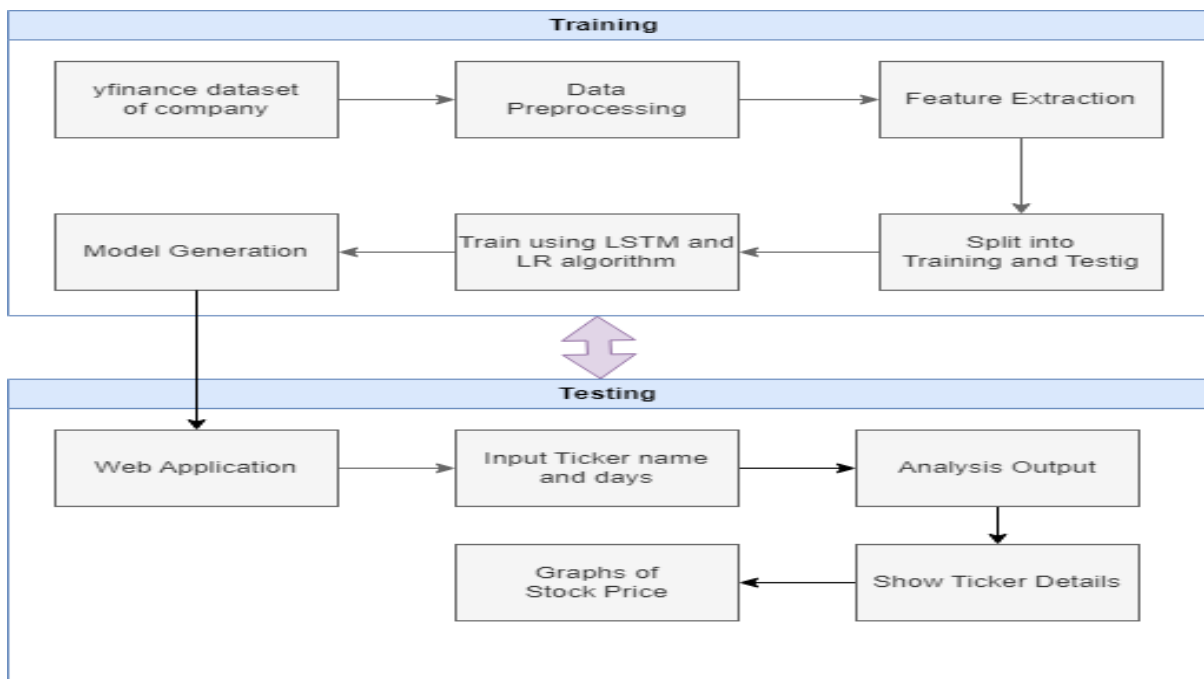
4) Predicting stock and stock price index movement using Trend Deterministic Data Preparation and machine learning techniques_Jigar Patel, Sahil Shah, Priyank Thakkar, K. Kotecha-Elsiver2015 Developing an application for analyzing and predicting stock market prices increases the investor's interest in stock markets. First, we have to analyze the present and emerging methods of stock price prediction. The different approaches are fundamental analysis, technical analysis, and also the application of machine learning. Fundamental analysis and machine learning are accustomed to guide an investor's decisions. Whereas the technical analysis methodology provides limited useful information. LSTM provide us with

a large range of parameters such as learning rates, and input and output biases. LSTM take longer to train and require more memory to train

IV. MODELING AND ANALYSIS

Analyses measurable data from stock market activities, such as stock prices, historical returns, and volume of historical trades; i.e. quantitative information that could identify trading signals and capture the movement patterns of the stock market.

For our exercise, we'll be looking at technical analysis solely and focusing on the Simple MA and Exponential MA techniques to predict stock prices. Additionally, we'll utilize LSTM (Long Short-Term Memory), a deep learning framework for time-series, to build a predictive model and compare its performance against our technical analysis



V. PROPOSED ALGORITHM

LSTM(LONG SHORT TERM MEMORY)

LSTM is a particular type of RNN with an extensive range of uses such as document classification, time series analysis, voice and speech recognition. Opposite to feedforward networks, the predictions (created by RNNs) are dependent on prior estimations. In experimental works, RNNs are not applied broadly due to include a few lacks that result in impractical estimations. Without investigation of too much detail, LSTM solves the problems by employing assigned gates for forgetting old information and learning new ones. LSTM layer is made of four neural network layers that interact in a specific method. A usual LSTM unit involves three different parts, a cell, an output gate and a forget gate. The main task of cell is recognizing values over random time intervals and the task of controlling the information flow into the cell and out of it belongs to the gates

LINEAR REGRESSION

In the most simple words, Linear Regression is the supervised Machine Learning model in which the model finds the best fit linear line between the independent and dependent variable i.e it finds the linear relationship between the dependent and independent variable.

Linear Regression is of two types: Simple and Multiple. Simple Linear Regression is where only one independent variable is present and the model has to find the linear relationship of it with the dependent variable Whereas, In Multiple Linear Regression there are more than one independent variables for the model to find the relationship.

VI. LIMITATIONS

The stock market prediction has attracted much attention from academia as well as business. Due to the non-linear, volatile and complex nature of the market, it is quite difficult to predict. As the stock markets grow bigger, more investors pay attention to develop a systematic approach to predict the stock market. Since the stock market is very sensitive to the external information, the performance of previous prediction systems is limited by merely considering the traditional stock data.

VII. RESULT AND DISCUSSION

For the prediction, which is followed by Last Value, XG Boost, Linear Regression, and Moving Average. In the prediction graph of LSTM method is shown. The method performs well along with the actual data and it predicts the almost identical pattern all the way.

In the case of Last Value, which is shown in we can see that if there is a random change in the price, the method behaves in the opposite manner as it predicts the earlier value.

We can see the model is the worst performer for our purpose. From the beginning, it shows deviation and could not predict the pattern. Therefore, by observing the MAPE calculation and graph plot, we conclude that the LSTM outperformed all the other methods and Moving Average shows the highest deviation for our case.



Information	
Symbol	ABR
Name	Arbor Realty Trust Common Stock
Last Sale	\$13.62
Net Change	-0.07
Percent Change	-0.511%
Market Capital	2181956116.0
Country	United States
IPO Year	2004.0
Volume	350646
Sector	Real Estate
Industry	Real Estate Investment Trusts



In this section, we discuss and compare the results of our proposed model, other approaches, and the most related works.

From the previous works, we found the most commonly exploited models for short-term stock market price trend prediction.

VIII. OVERVIEW OF MODULE:

In this project, we have demonstrated a machine learning approach (deep learning) to predict stock market trend using different neural networks. Results show how history data has been used to predict stock movement with reasonable accuracy. Also, with T test result analysis we can conclude that LSTM performs better in comparison to Linear Regression. For this implementation, we can conclude that if we incorporate all the factors that affect performance of the stock and feed them to neural network with proper data pre-processing and filtering, after training the network we will be able to have a model which can predict stock momentum more accurately and precisely for the better idea of stock value so that firms may have increased profit ratio as compared to what is might be going currently at that time. This will also lead to more transparency regarding stock as it will be easier for firms to analyze loses and achieve great success.

IX. CONCLUSION

The purpose of this study is to increase the accuracy to forecast the prediction of stock using the combination of sentimental analysis, stock trend analysis and deep learning. The ultimate goal was to increase the yield from the investment. The accuracy was found to lean towards precision with increased data. In conclusion we can say that if we train our system with more input data set, modify the deep learning module to perform more trial and errors tests, it has the potential to generate more accurate and significantly more consistent minimal error prediction. .

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REFERENCES

1. H. Isah, "Social Data Mining for Crime Intelligence: Contributions to Social Data Quality Assessment and Prediction Methods," University of Bradford, 2017.
2. P. Wei and N. Wang, "Wikipedia and stock return: Wikipedia usage pattern helps to predict the

individual stock movement," in Proceedings of the 25th International Conference Companion on World Wide Web, 2016, pp. 591-594: International World Wide Web Conferences Steering Committee.

3. E. Chong, C. Han, and F. C. Park, "Deep learning networks for stock market analysis and prediction: Methodology, data representations, and case studies," *Expert Systems with Applications*, vol. 83, pp. 187- 205, 2017.
 4. J. Zhang, S. Cui, Y. Xu, Q. Li, and T. Li, "A novel data-driven stock price trend prediction system," *Expert Systems with Applications*, vol. 97, pp. 60-69, 2018.
 5. L. S. Malagrino, N. T. Roman, and A. M. Monteiro, "Forecasting stock market index daily direction: A Bayesia Network approach," *Expert Systems with Applications*, vol. 105, pp. 11-22, 2018.
 6. M. B. Patel and S. R. Yalamalle, "Stock Price Prediction Using Artificial Neural Network" *International Journal of Innovative Research in Science, Engineering and Technology*, vol. 3, pp.13755- 13762, June 2014.
 7. Jie Wang, Jun Wang, Wen Fang. Financial Time Series Prediction Using Elman Recurrent Random Neural Networks[J]. *Computational Intelligence Neuro science*, 20162016(12):1-14
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