

USE OF DEEP LEARNING IN STOCK MARKET PREDICTION

Ms. Shikha Gupta

Asst. Professor, Dept of Management, Institute of Management Studies, Noida

Abstract

The purpose of our proposed system is to predict the stock market from previous years stock data. Increase in uncertainty in stock market gives us the motive for our proposed system to make it easy and available for common people to know and avoid losses using other technologies available today. The approach consists of the following steps - Data pre-processing, clustering, classification and visualization. Classification and correlation of data set makes it easy to understand similarities & dissimilarities amongst the data objects. In our proposed system data collection was done from yfinance. The significance of our proposed system is to give the commoner an insight in stock market pattern and awareness to avoid losses in prior.

Stock prices cannot be predicted exactly since it is neither systematic nor random. Even though we cannot predict exact price changes due to uncertainty but can predict the price patterns. The predicted results cannot be 100% accurate but the results show that our application helps in reducing occurrence of losses to a certain extent by providing idea about stock market price pattern. We are collecting stock data from source yfinance. This huge data is used as a record for creating a yfinance stock market analysis. So, the main challenge in front of us is developing a better, efficient stock market pattern detection tool to identify stock patterns effectively and give any suggestion to the viewer on how to proceed further.

Introduction

Predictive analytics is the use of advanced analytic techniques that leverage historical data to uncover real-time insights and to predict future events. Predictive analytics uses mathematical modeling tools to generate predictions about an unknown fact, characteristic, or event. "It's about taking the data that you know exists and building a mathematical model from that data to help you make predictions about somebody not yet in that data set," Goulding explains. An analyst's role in predictive analysis is to assemble and organize the data, identify which type of mathematical model applies to the case at hand, and then draw the necessary conclusions from the results. They are often also tasked with communicating those conclusions to stakeholders effectively and engagingly. The purpose of this proposed system is to

predict the stock market from previous years stock data. Increase in uncertainty in stock market gives us the motive for our proposed system to make it easy and available for common people to know and avoid losses using other technologies available today.

Stock prices cannot be predicted exactly since it is neither systematic nor random. Even though we cannot predict exact price changes due to uncertainty but can predict the price patterns. The predicted results cannot be 100% accurate but the results show that our application helps in reducing occurrence of losses to a certain extent by providing idea about stock market price pattern. We are collecting crime data from source yfinance. This huge data is used as a record for creating an yfinance stock market analysis. So, the main challenge in front of us is developing a better, efficient stock market pattern detection tool to identify stock patterns effectively and give any suggestion to the viewer on how to proceed further.

Applications of lstm

- Language modelling or text generation, that involves the computation of words when a sequence of words is fed as input. Language models can be operated at the character level, n-gram level, sentence level or even paragraph level.
- Image processing, that involves performing analysis of a picture and concluding its result into a sentence. For this, it's required to have a dataset comprising of a good number of pictures with their corresponding descriptive captions. A model that has already been trained is used to predict features of images present in the dataset.

Literature survey

[1] Stock Market Prediction Using Machine Learning

Stock Market Prediction Using Machine Learning (IJRASET),2013. Wise use of financial predictions plays a vital role in facilitating investment decisions for many investors. With the right information, investors can adjust their portfolio to maximize returns while minimizing risk. However, not all investments guarantee a good return, and this is mainly due to the fact that many investors have limited knowledge and skills to predict stock trends. However, the complexity and turmoil of the stock market, make any prediction efforts extremely difficult. This paper aims to provide a comprehensive review of the emerging research related to the use of Mechanical Learning and In-depth Learning models in the field of financial market forecast. To prepare for this task, more than sixty research papers have been thoroughly analyzed to extract the much-needed information, application, and results of the various methods. It is found in this proposed system that Intensive Reading is the most successful Automatic Reading in all the research papers collected, and is the most appropriate way to use the stock market prediction domain.

[2] Indian Stock Market Prediction using Machine Learning and Sentiment Analysis

Indian Stock Market Prediction using Machine Learning and Sentiment Analysis December 2017. Stock market is a very volatile in-deterministic system with vast number of factors influencing the direction of trend on varying scales and multiple layers. Efficient Market Hypothesis (EMH) states that the market is unbeatable. This makes predicting the uptrend or downtrend a very challenging task. This research aims to combine multiple existing techniques into a much more robust prediction model which can handle various scenarios in which investment can be beneficial. Existing techniques like sentiment analysis or neural network techniques can be too narrow in their approach and can lead to erroneous outcomes for varying scenarios. By combining both techniques, this prediction model can provide more accurate and flexible recommendations. Embedding technical indicators will guide the investor to minimize the risk and reap better returns.

[3] Stock Market Prediction Using Machine Learning

Stock Market Prediction Using Machine Learning, International Research Journal of Engineering and Technology (IRJET), Oct 2018. In the finance world stock trading is one of the most important activities. Stock market prediction is an act of trying to determine the future value of a stock or other financial instrument traded on a financial exchange. This paper explains the prediction of a stock using Machine Learning. The technical and fundamental or the time series analysis is used by the most of the stockbrokers while making the stock predictions. The programming language is used to predict the stock market using machine learning is Python. In this paper we propose a Machine Learning (ML) approach that will be trained from the available stocks data and gain intelligence and then uses the acquired knowledge for an accurate prediction. In this context this study uses a machine learning technique called Support Vector Machine (SVM) to predict stock prices for the large and small capitalizations and in the three different markets, employing prices with both daily and up-to-the-minute frequencies.

[4] Forecasting to Classification: Predicting the direction of stock market price using Xtreme Gradient Boosting

Forecasting to Classification: Predicting the direction of stock market price using Xtreme Gradient Boosting, October 2016. Stock market prediction is the art of determining the future value of a company stock or other financial instrument traded on an exchange. It had been a real challenge for analysts and traders to predict the trends of stock market due to its uncertain nature. Stock prices are likely to be influenced by the factors like product demand, sale, manufacture, investor's sentiments, ruling government, recession etc. The successful prediction of a stock's future price could yield significant profit.

The main aim of this paper is to design an efficient model which will accurately predict the trend of stock market using extreme Gradient Boosting (XG Boost) which has proved to be an efficient algorithm with over 87% of accuracy for 60 day and 90-day periods and it has proved to be much better when compared to traditional non-ensemble learning techniques. The prediction problem has been reconstructed as a classification problem and XG Boost turned out to be significantly better than the algorithms found in literature. The proposed model outperforms all existing forecasting models in literature and is able to forecast on long-term basis, an added feature absent in literature.

[5] Stock Closing Price Prediction using Machine Learning Techniques

“Stock Closing Price Prediction using Machine Learning Techniques, International Conference on Computational Intelligence and Data Science (ICCIDS 2019). Accurate prediction of stock market returns is a very challenging task due to volatile and non-linear nature of the financial stock markets. With the introduction of artificial intelligence and increased computational capabilities, programmed methods of prediction have proved to be more efficient in predicting stock prices. In this work, Artificial Neural Network and Random Forest techniques have been utilized for predicting the next day closing price for five companies belonging to different sectors of operation. The financial data: Open, High, Low and Close prices of stock are used for creating new variables which are used as inputs to the model. The models are evaluated using standard strategic indicators: RMSE and MAPE. The low values of these two indicators show that the models are efficient in predicting stock closing price.

System analysis

System requirements

Hardware requirements

OS – Windows 7, 8,10 RAM – Min 4GB

Software requirements

Pandas Matplotlib (line plot), Pandas , Y finance, TensorFlow , Keras, Sklearn, Python (Using PyCharm)

Inputs

The inputs are taken in the form of csv sheets., The historical data from January 2013-May 2022 of the following companies were taken Apple, Amazon, Tesla ,Netflix, Facebook, Google

Outputs

- The actual trained model stock price line plot.
- The test model predicted stock price line plot.
- The comparison of actual and predicted model line plot.
- The comparison between loss and mean absolute error.
- The Prediction graphs.

System implementation

Libraries

Proposed system involves set of Python libraries for Data Science. The libraries used here are as follows:

- NumPy
- Pandas
- Matplotlib (line plot)
- Yfinance
- TensorFlow
- Keras
- Sklearn
- Sequential
- Dense
- Lstm
- MinMax Scaler
- Math

Numpy

NumPy is a Python library that provides a simple yet powerful data structure: the n- dimensional array. This is the foundation on which almost all the power of Python's data science toolkit is built and learning NumPy is the first step on any Python data scientist's journey.

Pandas

Pandas is a significant change for data science and analytics, particularly if you came to Python because you were searching for something more powerful than Excel and VBA.

Matplotlib

Matplotlib is a 2-D plotting library that helps in visualizing figures. Matplotlib emulates Mat lab like graphs and visualizations. Mat lab is not free, is difficult to scale and as a programming language is tedious.

Line plot

A line plot is a graphical representation of data on a number line using dots, crosses, or any other symbol. It is known as a **line plot graph**.

Y finance

The y finance is one of the famous modules in Python, which is used to collect online data, and with it, we can collect the financial data of Yahoo.

Tensor flow

TensorFlow is a free and open-source software library for machine learning and artificial intelligence. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks.

Keras

Keras is an API designed for human beings, not machines. Keras follows best practices for reducing cognitive load: it offers consistent & simple APIs, it minimizes the number of user actions required for common use cases, and it provides clear & actionable error messages

Scikit-learn

Scikit-learn (Sk learn) is the most useful and robust library for machine learning in Python. This library, which is written in Python, is built upon **NumPy**, **SciPy** and **Matplotlib**.

Sequential

It is one of the models that is used to investigate varied types of neural networks where the model gets in one input as feedback and expects an output as desired.

Dense

The Keras dense layer which is one of the widely used layers used in neural networks. The dense layer is a neural network layer that is connected deeply, which means each neuron in the dense layer receives input from all neurons of its previous layer. **Lstm**

Using Keras and Tens or flow makes building neural networks much easier to build. It is much easier to build neural networks with these libraries than from scratch. The best reason to build a neural network from scratch is to understand how neural networks work.

Minmax scaler

Minmax scaler is the Python object from the Scikit-learn library that is used for normalizing our data. You can learn what Scikit-Learn is here. Normalization is a feature scaling technique that puts our variable values inside a defined range

Math

Python provides the **math module** to deal with such calculations. Math module provides functions to deal with both basic operations such as addition (+), subtraction (-), multiplication (*), division (/) and advance operations like trigonometric, logarithmic, exponential functions.

Performance analysis

Apple

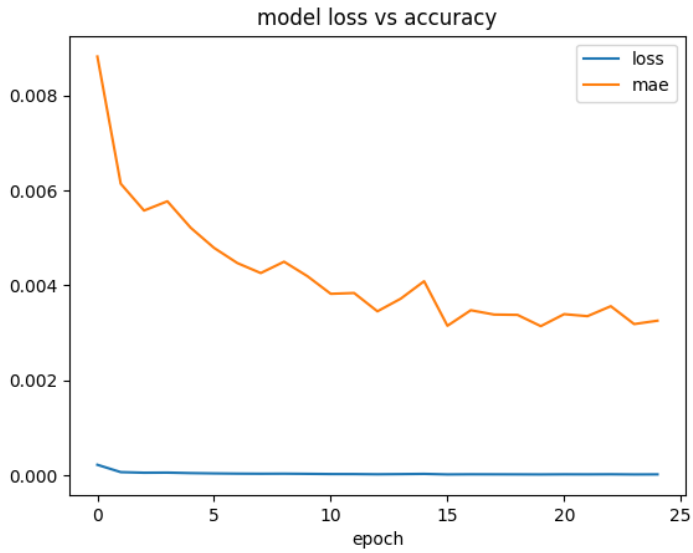


Fig 1: performance analysis Apple

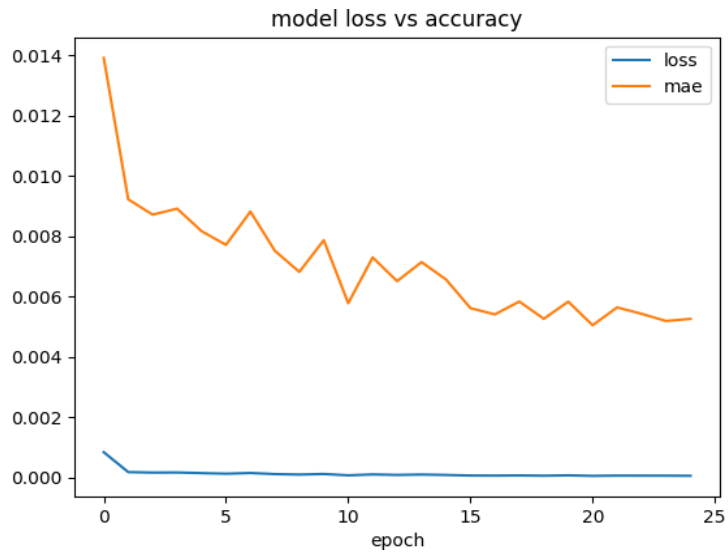
Amazon

Fig 2: performance analysis amazon

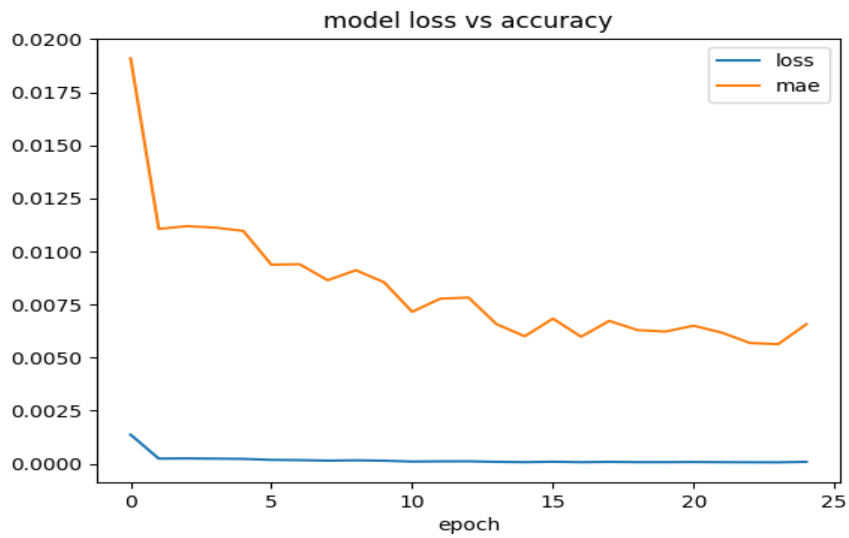
Facebook

Fig 3: performance analysis facebook

Google

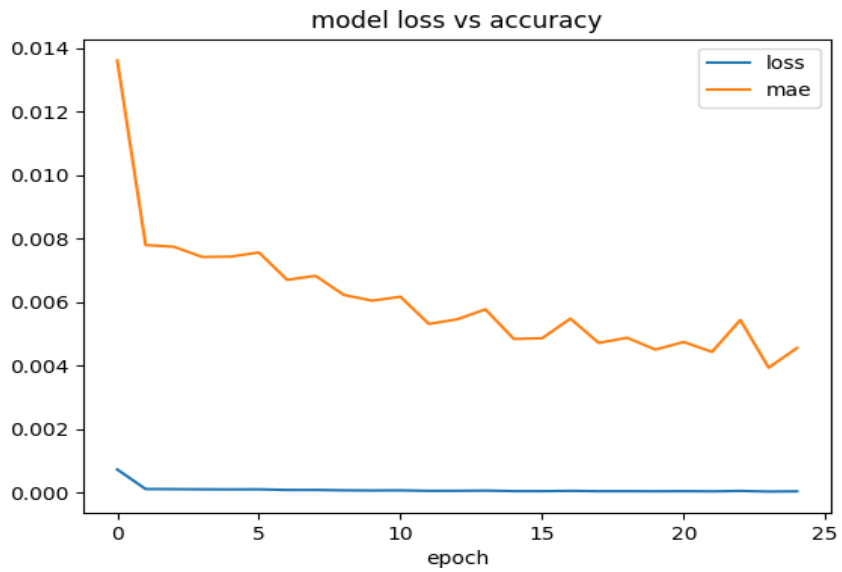


Fig 4: performance analysis google

Netflix

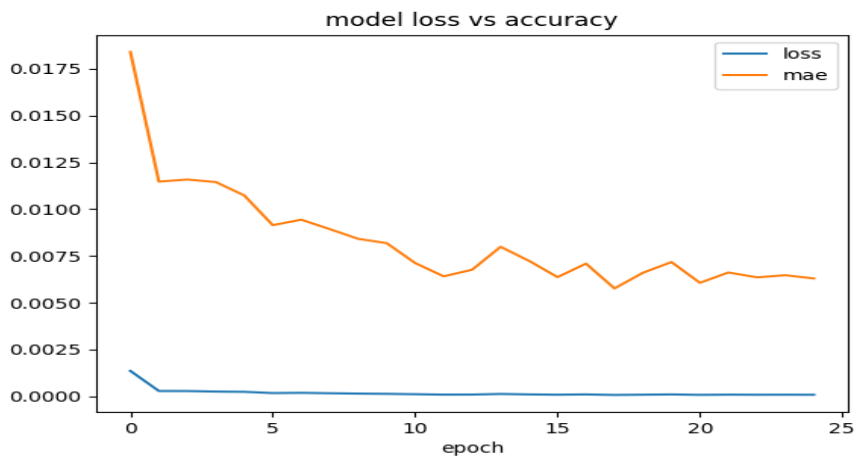


Fig 5: performance analysis netflix

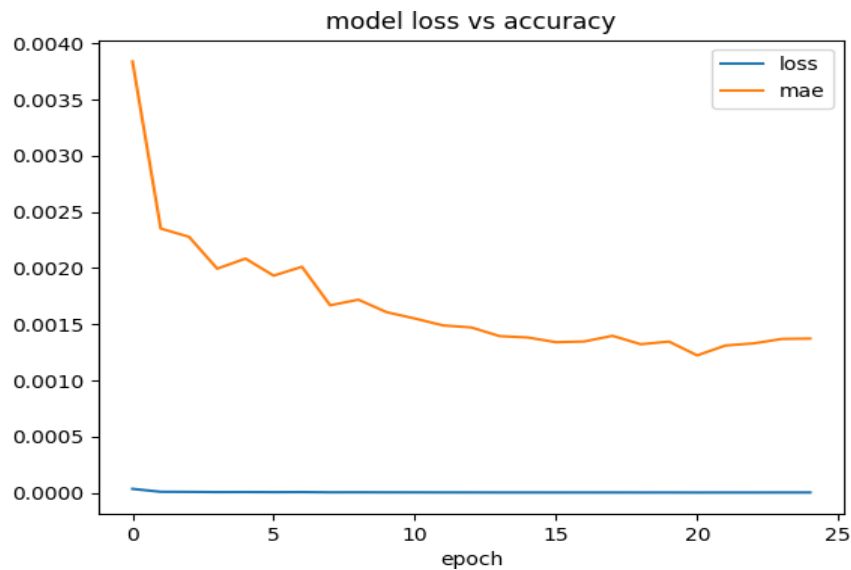
Tesla

Fig 6: performance analysis telsa

Conclusion

The popularity of stock market trading is growing rapidly between the domestic and international marker, which is encouraging researchers to find new methods for prediction using new techniques and using more and more of the historical dataset with time as it goes on increasing. The forecasting technique is not only helping the researchers, but it also helps investors and any individual dealing with the stock market.

In order to help predict the stock indices, a forecasting model with good accuracy is required. In our work, we have used one of the most precise forecasting technologies using Recurrent Neural Network and LSTM unit which will help investors, analysts or any person interested in investing in the stock market by providing them a good knowledge of the future situation of the stock market of domestic and international markets.

References

1. Stock Market Prediction Using Machine Learning Srihitha Podduturi, Geohnavi Marskatla, Dr.
SN Chandrashekhar, Mr. P. Anvesh, Ms. E. Lavanya, Mr. P. Pradeep Kumar, Dr. S. P. V. Subba
Rao(IJRASET),2013

2. Ashish Pathak, Nisha P Shetty, “Indian Stock Market Prediction using Machine Learning and Sentiment Analysis”, December 2017
3. V Kranthi Sai Reddy, “Stock Market Prediction Using Machine Learning”, International Research Journal of Engineering and Technology (IRJET), Oct 2018
4. Shubharthi Dey, Yash Kumar, Snehanshu Saha, Suryoday Basak, “Forecasting to Classification: Predicting the direction of stock market price using Xtreme Gradient Boosting”, October 2016.
5. Mehar Vijha, Deeksha Chandola, Vinay Anand Tikkiwal, Arun Kumar, “Stock Closing Price Prediction using Machine Learning Techniques”, International Conference on Computational Intelligence and Data Science (ICCIDS 2019)
6. Hiransha M , Gopalakrishnan E.A, Vijay Krishna Menon, Soman K.P, “NSE Stock Market Prediction Using Deep-Learning Models”, International Conference on Computational Intelligence and Data Science (ICCIDS 2018)
7. Abadi, Martin, “Deep learning with differential privacy”, Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security, ACM, 2016
8. Ishita Parmar, Navanshu Agarwal, Sheirsh Saxena, Ridam Arora, Shikhin Gupta, Himanshu Dhiman, Lokesh Chouhan, “Stock Market Prediction Using Machine Learning”, December 2018
9. Kunal Pahwa, Neha Agarwal, “Stock Market Analysis using Supervised Machine Learning”, 2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (Com-IT-Con), India, Feb 2019.
10. Adrian Costea, “Applying fuzzy logic and machine learning techniques in financial performance predictions”, 7th International Conference on Applied Statistics.
11. L Conference on Applied Statistics.