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Multiple Companies Stock Price Analysis and Prediction Using LSTM

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ABSTRACT:

In this project, we are using a deep learning approach to predict stock prices. Deep learning works well when it comes to predicting stock prices. The aim is to predict future stock prices and make better and more accurate investment decisions. Stock price analysis and prediction is a critical factor that impacts the success and reputation of the stock market. Therefore, good stock trend forecasting can help stockers to better their services and increase the growth of stocks. The stock exchange is a public business sector that exists to provide, acquire, and sell stocks that are traded either on a stock exchange or over the counter (OTC). The financial market is a place where financial investors can transfer ownership of investable resources. A functioning financial exchange is seen as essential for monetary events, as it enables businesses to rapidly access funds from the public. Consequently, a substantial amount of money, whether it be in the form of liquidity or a fund, is invested into various firm stocks to increase earnings for different investors and shareholders. Estimating stock prices is a challenging task that is simulated using machine learning to predict stock returns. As data becomes more accessible, traders can use deep learning algorithms to identify the trend of each stock and make decisions based on the data to enhance their trading capabilities. In this research, we suggest the use of deep learning algorithms, such as Long Short Term Memory, to predict the future worth of stocks over the past 15 days. We will utilize a dataset containing a range of features associated with stock market services such as symbol, date, close, high, low, open, volume, adjusted closing price, adjusted highest value, adjusted lowest value, adjusted opening price, adjusted trading volume, amount of cash dividend, and split factor. We deployed the LSTM model using a challenging task that is simulated using machine learning to predict stock returns. As data becomes more accessible, traders can use deep learning algorithms to identify the trend of each stock and make decisions based on the data to enhance their trading capabilities. In this research, we suggest the use of deep learning algorithms, such as long short term memory, to predict the future worth of stocks over the past 15 days. We will utilize a dataset containing a range of features associated with stock market services such as symbol, date, close, high, low, open, volume, adjusted closing price, adjusted highest value, adjusted lowest value, adjusted opening price, adjusted trading volume, amount of cash dividend and split factor. We deployed the LSTM model using the django framework and predicted the future price of the stocks.

Keywords: stock price prediction, deep learning, neural network, long short-term memory, time series model, django.

1. INTRODUCTION

In a highly competitive market, Stock Price Forecasting is one of the most important factors that determine the success of the stock market. Without a doubt, we have all encountered the term stock. Specifically, the stock is associated with partners and organizations that have become established and are transitioning into the marketization world. The second synonym for stock is share, a term that is frequently used in everyday conversations. It is also referred to as a "growth plan" and is perceived as a long-term asset accumulation strategy that generates and redistributes wealth during retirement. Successful stock forecasting can lead to substantial profits for both the buyer and seller. The stock market is an exchange where investors can buy and sell firm stocks. A stock is an investment in a firm that reflects ownership. Investors are able to purchase and sell shares on the exchange. Purchasing a firm's stock entitles an investor to a small share of the company. We are predicting stock prices using a machine learning algorithm to create a model that accurately predicts the stock price based on current market trends. To accurately predict stock values, we have used the recurrent neural networks of LSTMs. There were two types of stocks available. Intraday trading, also known as day trading, is a type of stock market where all positions are settled before the market closes each day. There is no possibility to change ownership once the market closes.

LSTMs are important because they can retain previous or past information, which makes them extremely powerful in sequence prediction tools. The findings of the study will help traders recognize the factors that have a significant impact on the stock market and focus their efforts on improving their services. The study will also contribute to the development of predictive analytics within the stock market by demonstrating the power of machine learning (ML) and deep learning (DL) algorithms to predict future stocks and inform strategic decisions. In the present paper, we present an LSTM-based method for predicting stock prices. The method is based on the use of historical stock price data to train the LSTM model for predicting future stock prices. The LSTM-network architecture consists of several layers of the LSTM cells. The input data can be used to capture long-term relationships and patterns in the LSTM. The proposed method can be useful for financial analysts, investors, and traders by providing them with useful insights for making decisions.

One of the most challenging things to predict is the performance of the stock market. There are many factors to consider – physical factors versus psychological factors, rational versus irrational behavior, and so on. All these factors combine to make the stock market volatile and very hard to predict with high accuracy. Machine learning techniques can use features such as the latest announcements of an organization. These can then be used to predict the future with unerring accuracy. Deep learning (DL) is the field of computer science that focuses on the development of algorithms that automatically improve as a result of experience and the use of data. It can be seen as a subset of Artificial Intelligence (AI). A deep learning algorithm builds a model on a set of sample data known as "training data". The goal of a deep learning algorithm is to discover how the machine can perform a task or make a decision without explicitly programmed by the algorithm. In practical terms, it can be more efficient to assist the machine in developing its algorithm rather than allowing human programmers to specify every step.

2. LITERATURE SURVEY:

This section provides an overview of relevant literature on stock price prediction, highlighting the findings of previous studies.

[1] Research on Stock Price Prediction Method Based on Convolutional Neural Network, IEEE 2019- Sayavong Lounnapha et al. This paper aims to create a model for predicting stock prices that focuses on convolutional networks, which are super smart and can learn on their own. We'll be teaching and testing the data set to see how they interact with each other and with the Thai stock market. The results show that the model can recognize when the stock market is changing and predict it, which is useful for predicting stock prices.

[2] Enhancing Profit by Predicting Stock Prices using Deep Neural Networks, IEEE 2019-Soheila Abrishami, et al., Prediction of Economic time series is a difficult and time-consuming process, which has captured the attention of many researchers and is of great importance to investors. This paper aims to present a deep learning model that uses a set of facts for a subset of stocks on the Nasdaq exchange to forecast the value of that stock. The model is trained on the smallest set of data for a specific stock and predicts the final value of that stock multi-steps ahead.

[3] Investors in Key EU countries like the UK and Germany are looking for a connection between equity prices and their combined finances. Stock market trends affect real financial products like investing and consumption. In a study from 2012, Fahad Almudahaf et al. looked at CIVETS' market efficiency over the years 2002 to 2012. They used the random walk hypothesis to figure out how the future price of an efficient stock market would be determined.

3. METHODOLOGY

The data in this study are multiple companies' stock price analysis and prediction using LSTM. which include the date, close, high, low, open, volume, adjusted closing price, adjusted highest value, adjusted lowest value, adjusted opening price, adjusted trading volume, amount of cash dividend and split factor. They are collected from Yahoo Finance. Stock price analysis prediction model implementation and performance evaluation are conducted with pre-processing.

A. Key steps

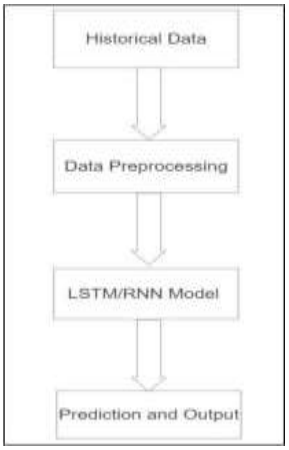

Fig.3.1 Steps in the process of methodology

Data Preparation:

Gain insight into the stock market over time, including things like past prices, trading volume, and maybe other things that affect stock prices.

Data Sequencing:

It is necessary to transform the time series data into fixed-length sequences, each of which should serve as a representation of the historical data that will be utilized by the Long short-term memory (LSTM) for prediction.

Data Splitting:

Divide the data into three parts: training, validation, and testing. The training part is for training the model, the validation part is for fine-tuning the parameters and the testing part is to measure the performance of the model.

Model Architecture:

Create a neural network architecture based on LSTM that is suitable for sequence predictions. This architecture typically consists of LSTM layer(s), stacked layer(s), and output layer(s).

Model Training:

Train your LSTM using the training data set. The LSTM learns to identify patterns and relationships in the past data set that can be leveraged for future price forecasts.

Model Evaluation: Assess the LSTM model's performance using appropriate evaluation metrics, such as Mean Absolute Error (MAE) or Root Mean Squared Error (RMSE).

B. Data Analysis

Descriptive Statistics about the data

```
AAPL.describe()
```

	Open	High	Low	Close	Adj Close	Volume
count	251.000000	251.000000	251.000000	251.000000	251.000000	2.510000e+02
mean	160.623467	162.391195	159.024622	160.777928	160.318385	6.938171e+07
std	19.054505	18.803135	19.298066	19.033378	19.214526	2.401096e+07
min	126.010002	127.769997	124.169998	125.019997	124.488876	3.145820e+07
25%	145.815002	147.340004	144.014999	145.919998	145.274216	5.127550e+07
50%	155.070007	157.500000	153.460007	155.330002	154.821548	6.452200e+07
75%	177.640001	179.415001	176.560005	177.504997	177.504997	8.109905e+07
max	196.240005	198.229996	195.279999	196.449997	196.185074	1.647624e+08

Fig.3.2 Descriptive Statistics

AAPL

Date	Open	High	Low	Close	Adj Close	Volume
2022-09-13	159.899994	160.539993	153.369995	153.839996	152.932755	122656600
2022-09-14	154.789993	157.100006	153.610001	155.309998	154.394073	87965400
2022-09-15	154.649994	156.240005	151.380005	152.369995	151.471420	90481100
2022-09-16	151.210007	151.350006	148.369995	150.699997	149.811249	162276800
2022-09-19	149.309998	154.559998	149.100006	154.479996	153.568970	81474200
...	...	...	...	...	...	...
2023-09-06	188.399994	188.850006	181.470001	182.910004	182.910004	81755800
2023-09-07	175.179993	178.210007	173.539993	177.559998	177.559998	112488800
2023-09-08	178.350006	180.240005	177.789993	178.179993	178.179993	65561300
2023-09-11	180.070007	180.300003	177.339996	179.360001	179.360001	58953100

Fig.3.3 Summary of the dataset

C. Exploratory Data Analysis

Fig.3.4 Closing Price of Tech Stocks

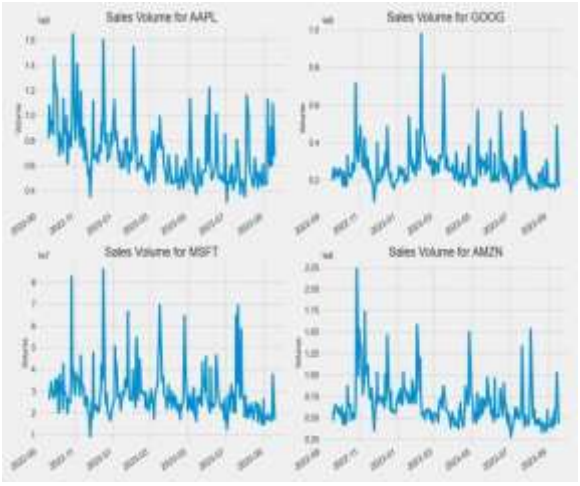

Fig.3.5 Total Volume of Stock being traded each day

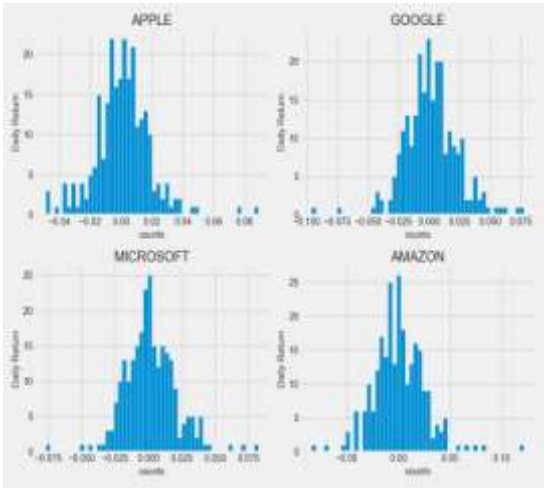

Fig.3.6 Daily return of Tech Stocks

Fig.3.7 Sales Volume of Tech Stocks

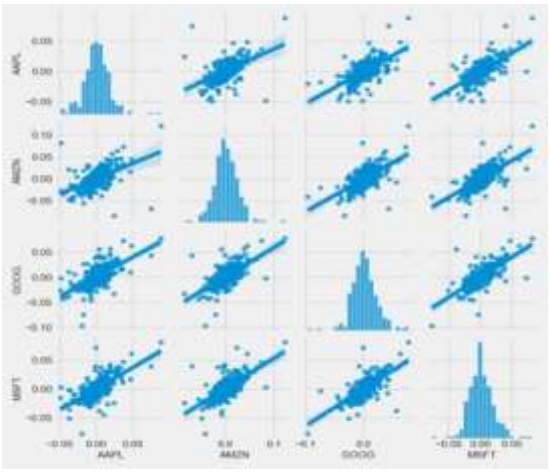

Fig.3.8 Data Visualization

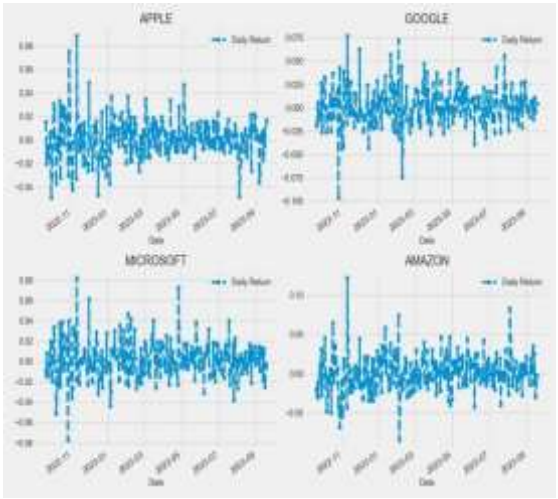

Fig.3.9 Daily Return percentage of Stocks

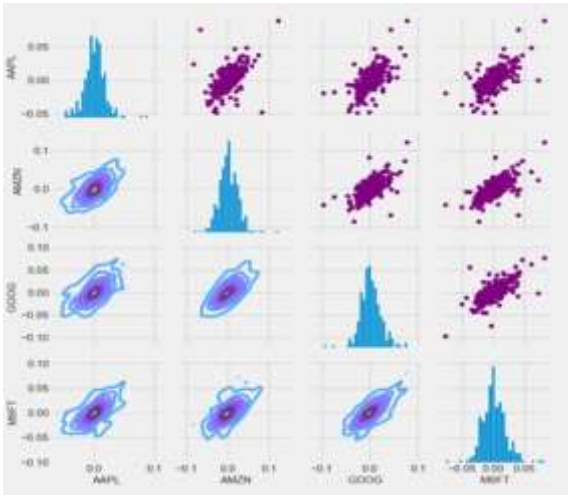

Fig.3.10 Data Visualization of Stocks Comparison

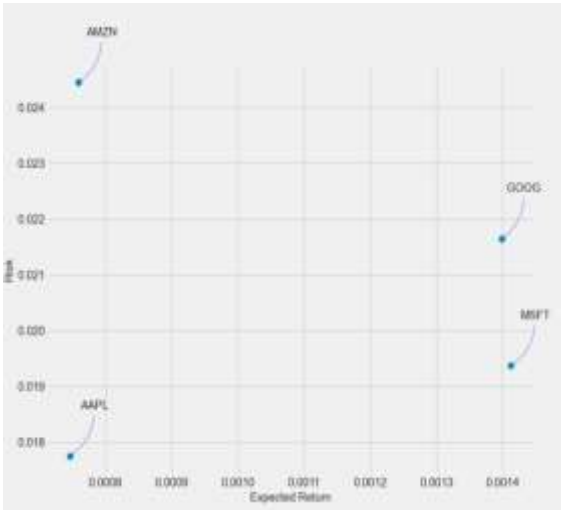

Fig.3.11 A figure illustrates the comparison between Expected Return and Risk

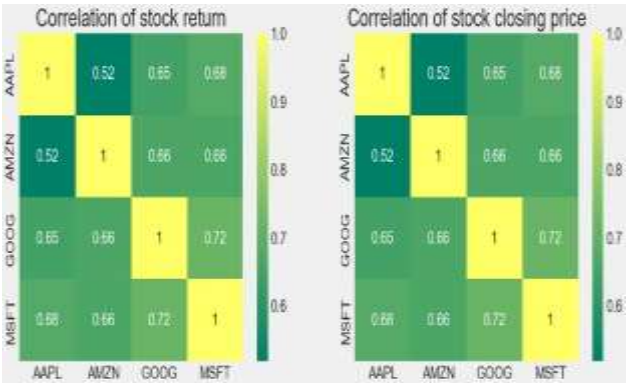

Fig.3.12 Correlation of stock closing price

3.4 Feature Selection

Our goal is to get rid of any features that don't help us with our predictive modeling. This includes anything that doesn't help us target class differences, as well as any features that are highly correlated, which can lead to problems with analysis. The confusion matrix provides a visual representation of supervised learning performance in the artificial intelligence domain. When true is declared, it is referred to as True Positive (TP), False is declared False (NP), and False is reported False (FP). When false is declared False, it is presented as True Negative (TN). In this study, the highest accuracy is calculated from the root mean squared error and mean squared error, and the Confusion matrix is analyzed. As much as possible, we want to maintain features that include survey entries, so that we can identify areas of flight satisfaction. For this purpose, we apply heat map correlation for feature selection. We found that multi- collinearity does not exist between the independent features. Hence, we consider all the features.

3.5 Deep Learning Algorithm

3.5.1 Long Short Term Memory

LSTM is a Neural Network (NLP) algorithm that specializes in the processing of time series data to identify long-term dependencies. It has been extensively used in the stock price prediction process due to its capacity to process sequential data and recognize intricate patterns.

LSTM is a Neural Network (NLP) algorithm that specializes in the processing of time series data to identify long-term dependencies. It has been extensively used in the stock price prediction process due to its capacity to process sequential data and recognize intricate patterns.

```
from keras.models import Sequential
from keras.layers import Dense, LSTM
#build the LSTM model
model = Sequential()
model.add(LSTM(128, return_sequences=True, input_shape=(x_train.shape[1],1)))
model.add(LSTM(64, return_sequences=False))
model.add(Dense(25))
model.add(Dense(1))
#Compile the model
model.compile(optimizer='adam', loss='mean_squared_error')
#Train the model
model.fit(x_train, y_train, batch_size=1, epochs=1)
```

```
2735/2735 [==============================] - 158s 55ms/step - loss: 0.0011

<keras.callbacks.History at 0x274a88dcfd0>
```

Fig.3.13 Model Summary

4. RESULTS AND MODEL EVALUATION

Predicting the closing stock price of APPLE.NIC:

```
#show the valid and predicted prices
valid
```

Date	Close	Predictions
2023-02-10	151.009995	151.949219
2023-02-13	153.850006	151.725952
2023-02-14	153.199997	151.992065
2023-02-15	155.330002	152.263809
2023-02-16	153.710007	152.917679
...	...	...
2023-09-06	182.910004	185.164993
2023-09-07	177.559998	184.719299
2023-09-08	178.179993	182.685013
2023-09-11	179.360001	180.595154
2023-09-12	176.300003	179.118820

147 rows × 2 columns

Figure 4.1

```
#Get the root mean squared error(RMSE)
rmse = np.sqrt(np.mean(((predictions - y_test) **2)))
rmse
```

```
20.875741629894137
```

Figure 4.2

Figure 4.2 shows the accuracy, MSE and RMSE values for no of iterations (epochs)

Figure 4.3

Figure 4.3 illustrates the prediction of the closing stock price of APPLE.NIC:

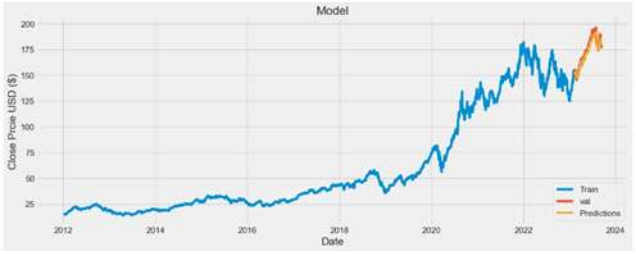

Figure 4.4

In the results, as we have shown in Figure 4.4, the graph shows the Trade Close value for the Google dataset. The blue line in this graph represents the training data, while the yellow hue represents the projected values from the test data.

5. CONCLUSION

In conclusion, the use of deep learning to predict stock prices can provide insight into potential patterns and trends. However, it should be employed as part of a comprehensive investment plan that considers a broad array of factors, such as market conditions, economic trends, and the company's overall performance. Generally, the accuracy of LSTM stock price predictions will depend on several factors, including the type of stock you are analyzing, the time frame you are looking at, and the features you are training the model with. Therefore, it is important to assess the accuracy of any stock price forecast model carefully and take into account other factors, such as market movements and news events, before making an investment decision based on its predictions.

V. REAL-TIME APPLICATION

A. Multitask learning:

The predictive accuracy of stock prices can be improved by utilizing multi-task learning, which involves the training of a model to perform multiple tasks at the same time, resulting in improved overall performance. These tasks may include predicting the movement of the stock, as well as the actual price of the stock.

B. Real-time predictions:

Real-time stock price predictions could be a game- changer for traders and investors alike. Developing models capable of rapidly processing and analyzing data to make real-time predictions could be a lucrative field of study.

C. Explainable Artificial Intelligence (AI):

While the Long-Term Stemming Model (LSTM) and Random Numerical Network (RNN) models are highly effective, their interpretation can be challenging. Developing methods to elucidate how the model makes its predictions could enhance user confidence and comprehension of the model.

D. Deployment:

Django is an easy-to-use Python web framework that helps you quickly build secure and easy-to-operate websites. It's based on the Model-Temple-View (MTV) architecture and comes with lots of pre-built features and tools. Stock prices are determined by supply and demand over time, and we can use deep learning to identify patterns that can help us predict the future price of a stock. LSTM is one of the most popular networks used for series forecasting, and it's made up of Recurrent Neural Networks (RNNs) that can remember information over long periods. These networks are great for time series data, and they can process it step by step, storing the information they've seen in a summary. If they're able to predict the price of a stock accurately, it could lead to big profits.

E. Outputs:

The real-time stock price data is displayed on the application's Home page in Fig 5.1 and Fig 5.2.

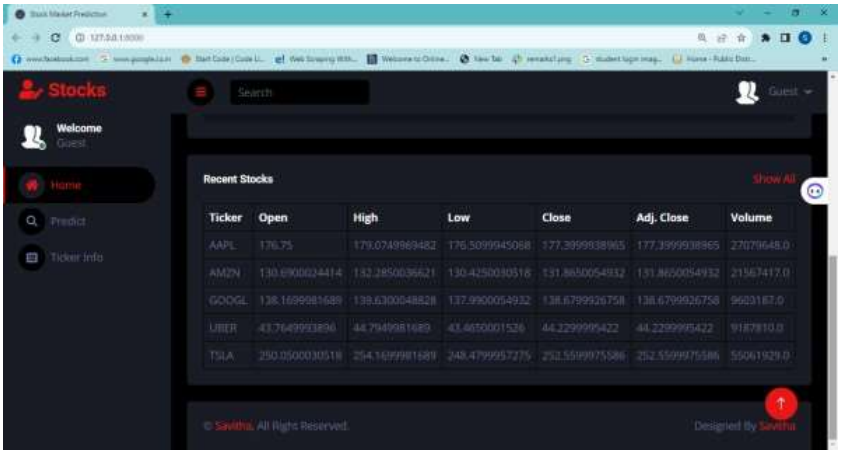

Figure 5.1

Figure 5.2

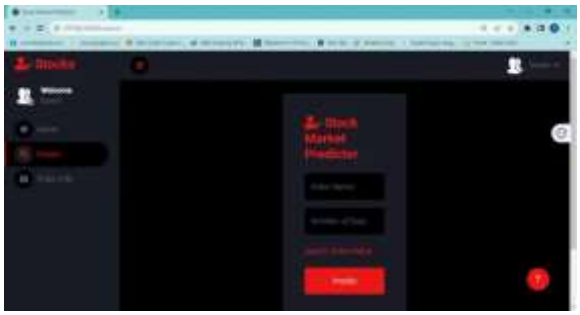

Figure 5.3

To predict the price of the stock, we go to the prediction page where we have to enter the correct ticker value and the number of days, and click on the predict button.

Figure 5.4

The Left Graph represents the current stock price of the ticker that has been searched for the preceding one day, while the Right Graph represents the predicted stock price of the number of days that the ticker has been searched.

6. ACKNOWLEDGEMENT

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7. REFERENCES

1) Patel, J., Shah, S., Thakkar, P., Kotecha, K. (2015). Predicting stock and stock price index movement using trend deterministic data preparation and machine learning techniques. Expert systems with applications, 42(1), 259- 268. 2) Lee, J. W. (2001, June).

2) Stock price prediction using reinforcement learning. In ISIE 2001. 2001 IEEE International Symposium on Industrial Electronics Proceedings (Cat. No. 01TH8570) (Vol. 1, pp.690-695). IEEE.

3) Usmani, M., Adil, S. H., Raza, K., Ali, S. S. A. (2016, August). Stock market prediction using machine learning techniques. In 2016 3rd International Conference on Computer and Information Sciences (ICCOINS) (pp. 322- 327). IEEE.

4) Learning Python for Data Analysis and Visualization Ver 1 | Udemy

5) Manh Ha Duong Boriss Siliverstovs June 2006 - The Stock Market and Investment.