Stock Market Prediction

Major Project (PW761CS)

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Abstract

Stock market data is a time-series data in which stock value varies depends on time. Prediction of the stock market is an endeavour to assess the future value of a company's stock rate which will increase the investor's profit. The proposed system predicts the stock price of any company mentioned by the user for the next few days. Using the predicted stock price and datasets collected from various sources regarding certain equity, the overall sentiment of the stock is predicted.

Introduction

The stock prices are volatile in nature and are hard to predict them. The market price movement changes due to various reasons and the sentiment of the market depend on the current issues and decision was taken not only by a single person but also a lot more who invest their money in this. All the people who invest in the market should be able to decide where to invest their money. Predicting time series data to forecast stock prices is one of the applications of machine learning techniques.

Problem Statement

Because of usefulness and needs from the people, opinion mining became an active research area.

As the volume of the opinionated data increases, analyzing and summarizing opinionated data is becoming more important. To satisfy these needs, many kinds of opinion summarization techniques are proposed.

Objective

➔ To make a reliable prediction tool that is better and more accurate than the ones the market provides
➔ To make a simple UI/UX that makes it easy for non-programmers to use the tool

Literature survey

➔ Roondiwala, Murtaza, H. Patel and Shraddha Varma. "Predicting Stock Prices Using LSTM." (2017).

➔ Kannan, Sekar, Sathik and P. Arumugam in used data mining technology to discover the hidden patterns from the historic data that have probable predictive capability in their investment decisions.

➔ The prediction of stock market is challenging task of financial time series predictions.

➔ There are five Methods namely Typical price(TP),Bollinger bands, Relative strength index (RSI), CMI and MA used to analyzed the stock index.

Methods for prediction

Model	Pros	Cons
Linear Regression	· Easy to understand · Handles different components	· Sensitive to outliers · Strong assumptions
ARIMA	· Easy to understand · Fits historical data well · Forecasts unbiased	· Sensitive to outliers · Small forecast range
Prophet	· Easy to understand · Analyst in the loop · Data efficient · Fast	· Sensitive to compounding seasonality · Required data format
Deep Learning *Neural Networks LSTM Transfer Learning*	· Can take in many complex variables · Finds nonlinear patterns · Strong predictions · Easy to automate	· Difficult to understand · Requires a lot of data

LSTM

- Long-Short-Term Memory Recurrent Neural Network belongs to the family of deep learning algorithms. It is a recurrent network because of the feedback connections in its architecture. It has an advantage over traditional neural networks due to its capability to process the entire sequence of data.

- LSTMs are very powerful in sequence prediction problems because they're able to store past information. This is important in our case because the previous price of a stock is crucial in predicting its future price.

- LSTM Networks are popularly used on time-series data for classification, processing, and making predictions. The reason for its popularity in time-series application is that there can be several lags of unknown duration between important events in a time series.
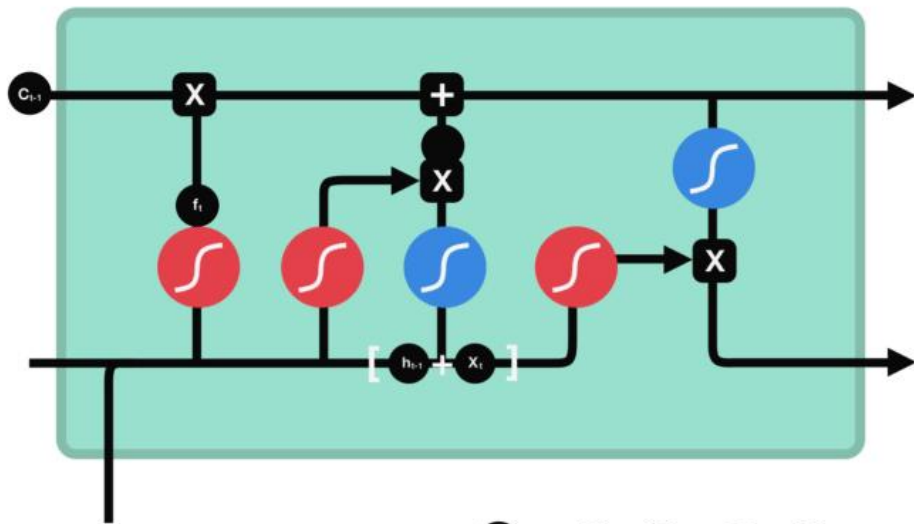
$$c_t = f_t * c_{t-1} + i_t * \hat{c}_t$$

c_{t-1} previous cell state

f_t forget gate output

i_t input gate output

$\hat{c}_t$ candidate

c_t new cell state

Approach
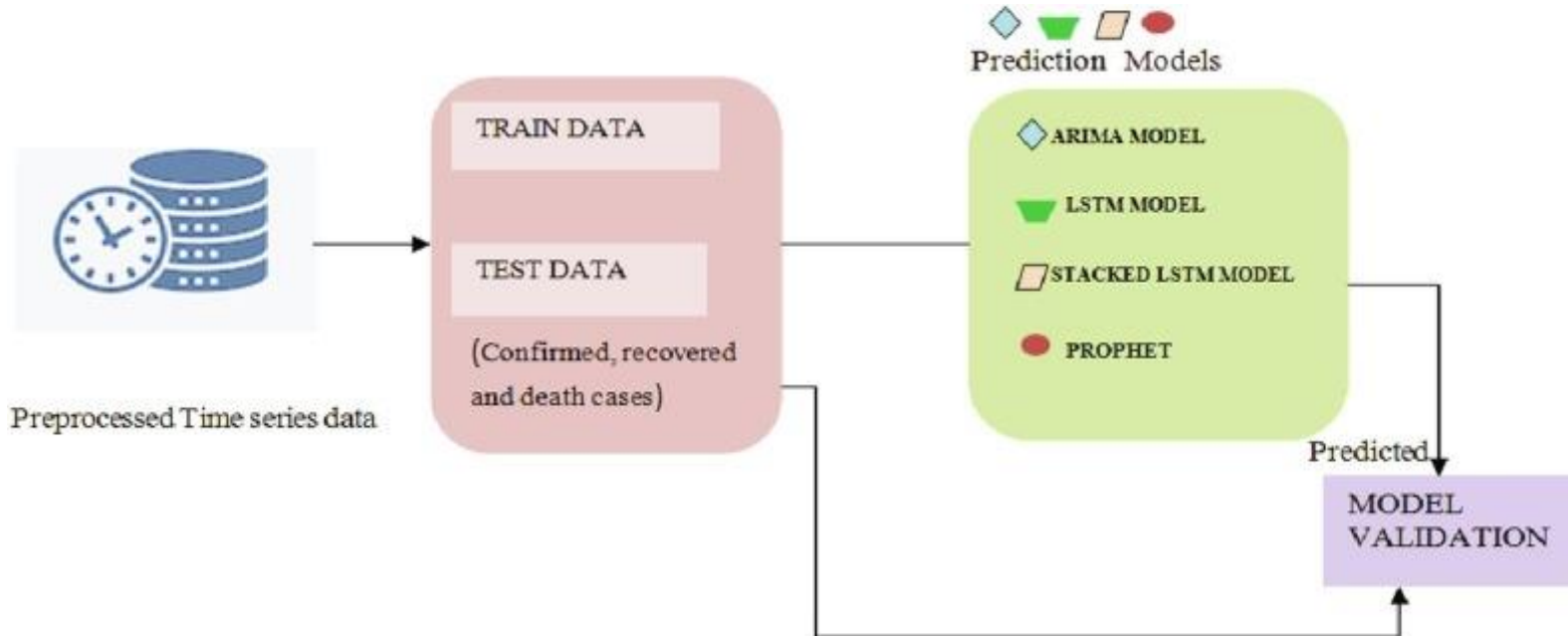
System Architecture
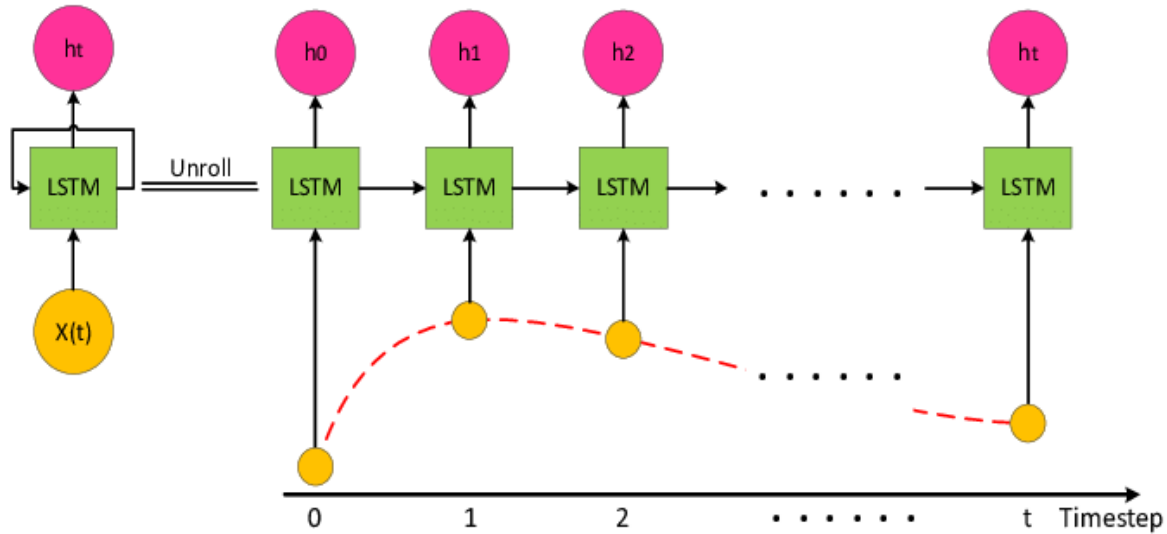
Algorithm

1. Import
2. Read the dataset
3. Analyze the closing prices from dataframe
4. Sort the dataset on date time and filter "Date" and "Close" columns
5. Normalize the new filtered dataset
6. Build and train the LSTM model
7. Take a sample of a dataset to make stock price predictions using the LSTM model
8. Save the model
9. Visualize the predicted stock costs with actual stock costs

Requirements

➔ Minimum Hardware Requirements

➔ Minimum Software Requirements

Minimum Software Requirements

Programming Language: Python

Tools & Libraries: matplotlib, Plotly Dash, pandas datareader, keras

IDE: Visual Studio Code

User Interface: Plotly Dash (for visualization)

Prerequisites: Python, Machine Learning, Deep Learning, Neural Networks

Minimum Hardware Requirements

ROM: 30 GB Hard Disk

RAM: 8+ GB

Processor: i5**+**

I/O Devices: Keyboard, Mouse, Laptop**.**

Steps

1. Run Stock_pred_live_Apple.py
2. Run Stock_pred_live_Tesla.py
3. Run Stock_pred_live_Microsoft.py
4. Run Stock_pred_live_Facebook.py
5. It creates h5 files with models stored in each which will be used by Stock_app_live.py
6. Run Stock_app_live.py
7. Open link from terminal which is a locally hosted site. That is your target.

Dataset

Date	Open	High	Low	Close	Adj Close	Volume
27-04-20	70.45	71.135	69.9875	70.7925	70.24797	117087600
28-04-20	71.27	71.4575	69.55	69.645	69.1093	112004800
29-04-20	71.1825	72.4175	70.9725	71.9325	71.3792	137280800
30-04-20	72.49	73.6325	72.0875	73.45	72.88503	183064000
01-05-20	71.5625	74.75	71.4625	72.2675	71.71163	240616800
04-05-20	72.2925	73.4225	71.58	73.29	72.72627	133568000
05-05-20	73.765	75.25	73.615	74.39	73.8178	147751200
06-05-20	75.115	75.81	74.7175	75.1575	74.57939	142333600
07-05-20	75.805	76.2925	75.4925	75.935	75.35091	115215200
08-05-20	76.41	77.5875	76.0725	77.5325	77.14439	134048000
11-05-20	77.025	79.2625	76.81	78.7525	78.35828	145946400
12-05-20	79.4575	79.9225	77.7275	77.8525	77.46279	162301200
13-05-20	78.0375	78.9875	75.8025	76.9125	76.5275	200622400
14-05-20	76.1275	77.4475	75.3825	77.385	76.99764	158929200
15-05-20	75.0875	76.975	75.0525	76.9275	76.54241	166348400
18-05-20	78.2925	79.125	77.58	78.74	78.34585	135372400
19-05-20	78.7575	79.63	78.2525	78.285	77.89313	101729600
20-05-20	79.17	79.88	79.13	79.8075	79.40801	111504800
21-05-20	79.665	80.2225	78.9675	79.2125	78.81598	102688800
22-05-20	78.9425	79.8075	78.8375	79.7225	79.32343	81803200

Datasets

- ➔ Used datasets of Apple, Microsoft, Tesla and Facebook.
- ➔ Used data of 5 years (2016-2021)
- ➔ 80 percent data used to train and 20 percent to test.
- ➔ Used **Yahoo finance** to get the accurate data with the help of pandas data-reader library of python

Microsoft Stock Prediction

Facebook Stock Prediction

Apple Stock Prediction

Tesla Stock Prediction

Stock Price Analysis Dashboard

Apple Stock Data	Tesla Stock Data	Microsoft Stock Data	Facebook Stock Data	Comparison of Stock Data

Actual closing price

scatter plot

LSTM Predicted closing price

scatter plot
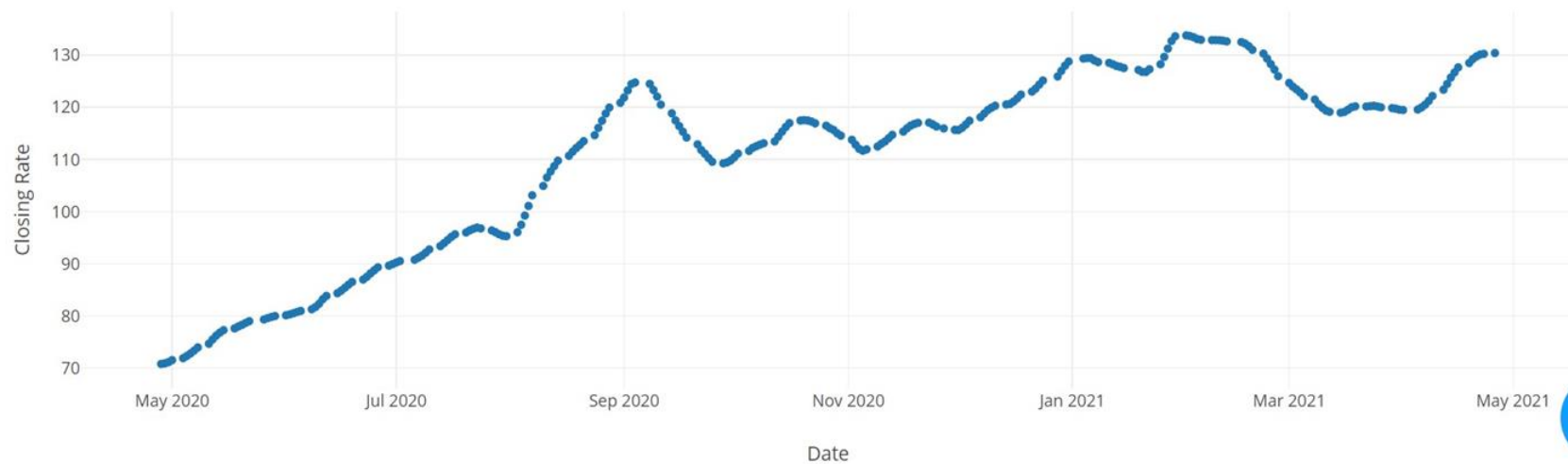
Comparison of Stocks
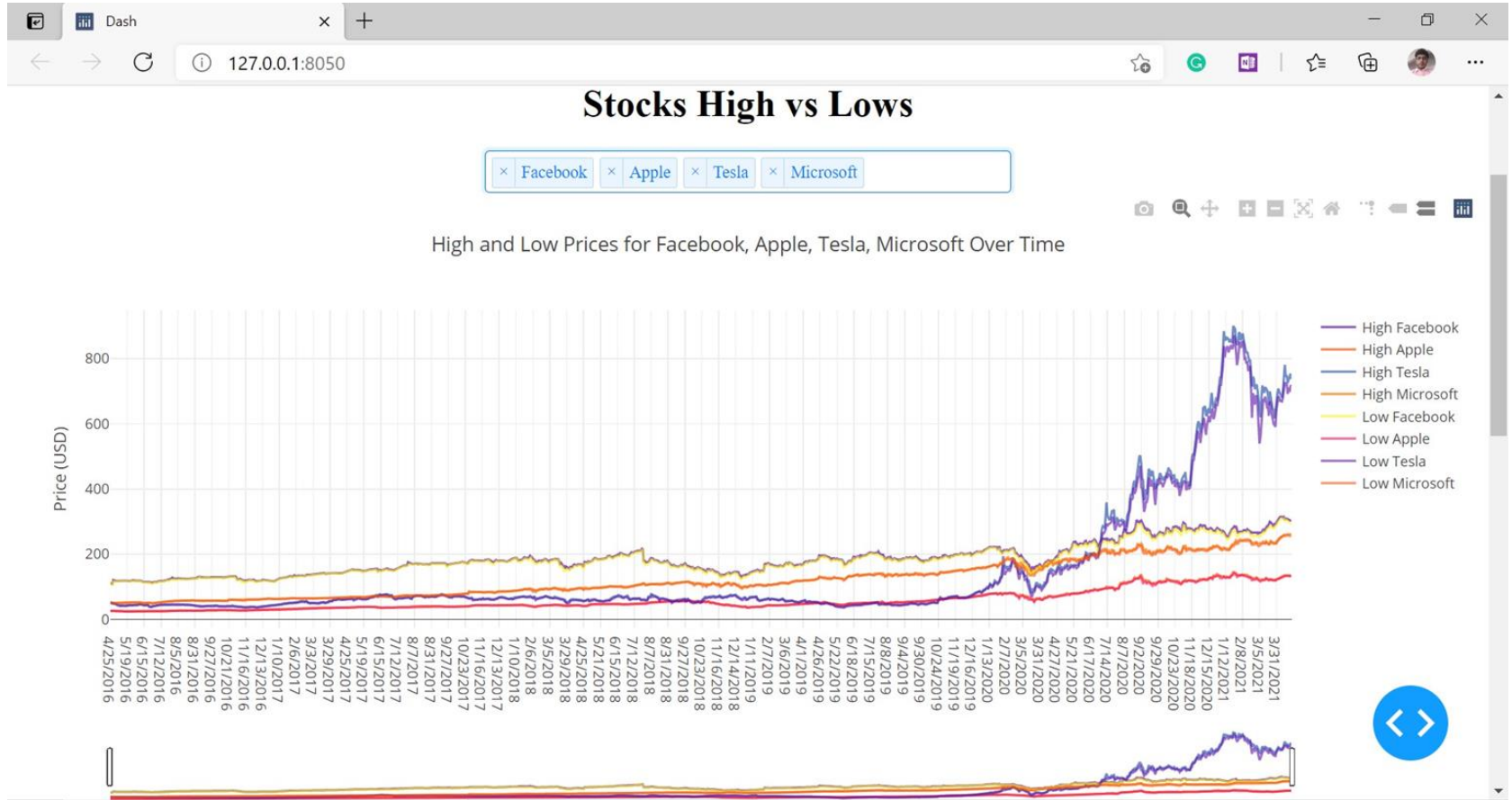
Accuracy measure of Predicted Stock
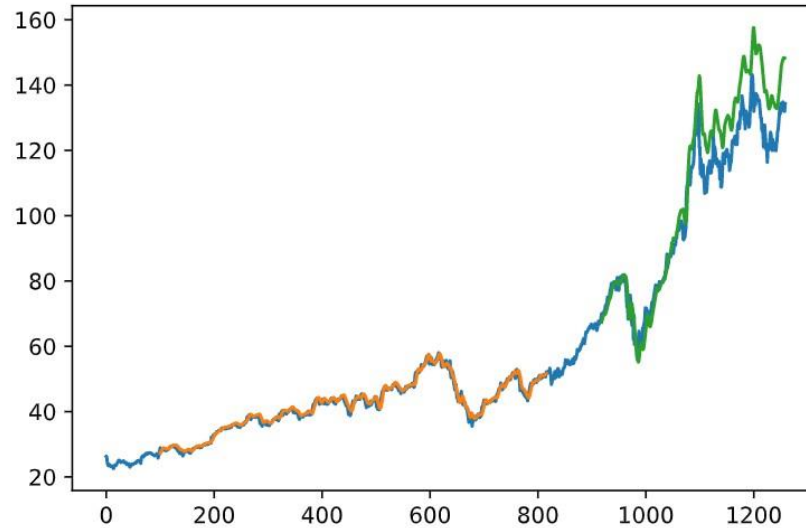
Conclusion

We implement the application of Artificial Neural Network to the task of stock market prediction and ANN model and salient feature. Our initial analysis show significant correlation between different input parameter. The result obtained in both the cases was fairly accurate. The prediction is fairly accurate unless there is huge and sudden variation in the actual data. On other hand, this also proves the hypothesis that stock market are actually unpredictable.
After the phase of prediction and analysis, the result will be displayed to users in the form web pages

Future scope of improvement

• Potential improvement can be made to our data collection and analysis method.
• Future research can be done with possible improvement such as more refined data and more accurate algorithm.
• Implementation of discussion forums and economic news portal including other sector apart from hydropower and going in national level.

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Thank You