Prediction of Stock Price Using Deep Learning

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Introduction

- Financial Market have a vital role in the development of modern society. They allow the deployment of economic resources.Changes in stock prices reflect changes in market.
- We are focusing to predict prices of stock using deep learning model.
- This is a challenging task because there is much noise and uncertainty in information related to stock prices.
- We are going to use Long-Short Term Memory(LSTM) to predict the stock price.

Sourcing Data

- Source - Yahoo Finance
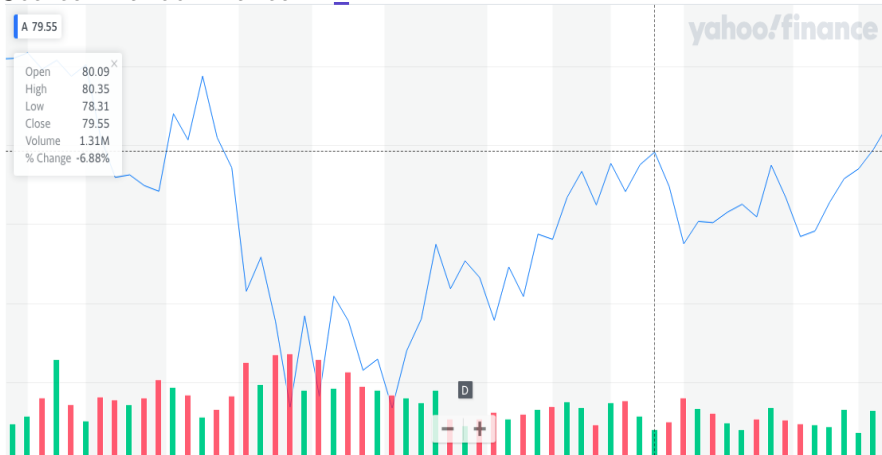
Imported Data

Date	High	Low	Open	Close	Volume	Adj Close
2012-01-03	58.928570	58.428570	58.485714	58.747143	75555200.0	50.857235
2012-01-04	59.240002	58.468571	58.571430	59.062859	65005500.0	51.130558
2012-01-05	59.792858	58.952858	59.278572	59.718571	67817400.0	51.698215
2012-01-06	60.392857	59.888573	59.967144	60.342857	79573200.0	52.238651
2012-01-09	61.107143	60.192856	60.785713	60.247143	98506100.0	52.155792
...	...	...	...	...	...	...
2019-12-11	271.100006	268.500000	268.809998	270.769989	19689200.0	269.399658
2019-12-12	272.559998	267.320007	267.779999	271.459991	34327600.0	270.086151
2019-12-13	275.299988	270.929993	271.459991	275.149994	33396900.0	273.757477
2019-12-16	280.790009	276.980011	277.000000	279.859985	32046500.0	278.443604
2019-12-17	281.769989	278.799988	279.570007	280.410004	28539600.0	278.990875

2003 rows × 6 columns

Visualising Closing Price

Scaling Data

- Scaled Data using MinMaxScaler with feature range =(0,1)

```
array([[0.01316509],
       [0.01457064],
       [0.01748985],
       ...,
       [0.97658263],
       [0.99755134],
       [1.        ]])
```

Reshaping Data

- We need to reshape the data as LSTM model requires data to be 3-D in the form of Number of Samples, Number of Time Steps and Number of Features.
- We converted data to Numpy Array and reshaped it.

```
#Reshape the data
x_train = np.reshape(x_train, (x_train.shape[0],x_train.shape[1],1))
x_train.shape
```

```
(1543, 60, 1)
```

Model Architecture

- First Layer = 50 Neurons and Return Sequence =True
- Second Layer = 50 Neurons and Return Sequence = False
- Third Layer = Dense Layer with 25 Neurons
- Last layer = Dense Layer with 1 Neuron
- Compiled Model using Adam and Loss Function as Mean Squared Error.

Training the Model

- Batch Size $= 1$
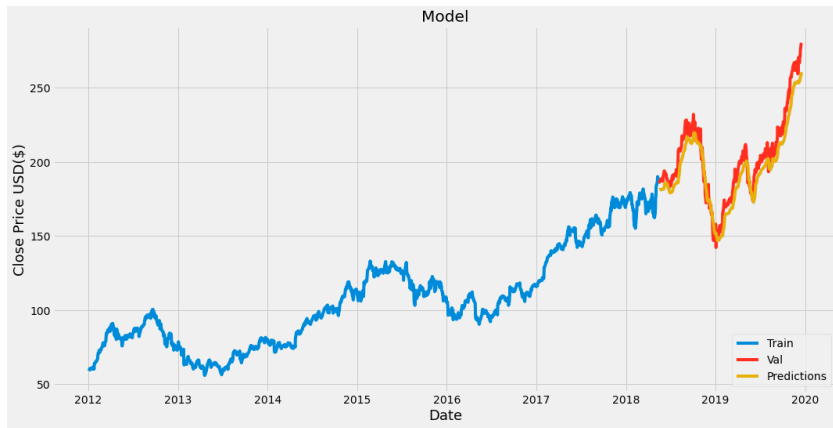- Epoch $= 1$
- Loss $= 8.1236$e-04

Results

Figure: Validated and Predicted Closing Price
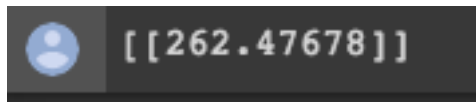
Results

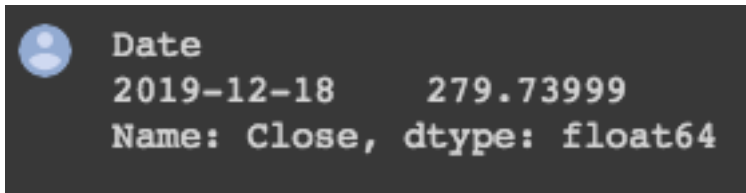- Apple Inc Stocks

Figure: Predicted Close Price

Figure: Actual Close
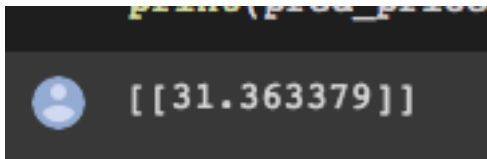
UBER Stocks

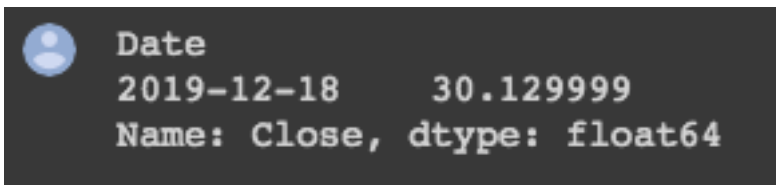- UBER Stocks

Figure: Predicted Price

Figure: Actual Close Price

Progress to be made

- Need to add various Financial Methods used to predict by volatility and volumes.
- Need to add Sentiment Analysis using web-mining in real time.
- Need to optimize risk calculator and do transactions accordingly by setting threshold.

References

- Stock Prices Prediction Using Deep Learning Models by Jialin Lu, Fei Chao, Yu-Chen Lin, Chih-Min Lin
- Options, Derivatives and Futures by John C. Hull
- Deep Learning Calibration of option Pricing Models by A Itkin

THANK YOU