STOCK MARKET PREDICTION

A Project Work submitted in partial fulfillment of the
requirements for the degree of

Bachelor of Technology

in

Computer Science and Engineering

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DECLARATION

Project Title: **STOCK MARKET PREDICTION**

Degree for which the project work is submitted: **Bachelor of Technology in Computer Science and Engineering**

We declare that the presented project represents largely my own ideas and work in my own words. Where others ideas or words have been included, I have adequately cited and listed in the reference materials. The report has been prepared without resorting to plagiarism. I have adhered to all principles of academic honesty and integrity. No falsified or fabricated data have been presented in the report. I understand that any violation of the above will cause for disciplinary action by the Institute, including revoking the conferred degree, if conferred, and can also evoke penal action from the sources which have not been properly cited or from whom proper permission has not been taken.

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Date:- 08-May-2019

CERTIFICATE

It is certified that the work contained in this project entitled **"Stock Market Prediction"** submitted by **Rishi Raj (1513101495), Shivam Kumar (1513101572), Mayank Kandpal (1513101512), Saumya Tripathi (1513101451)** for the degree of Bachelor of Technology in Computer Science and Engineering is absolutely based on their own work carried out under my supervision and this project work has not been submitted elsewhere for any degree.

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TABLES OF CONTENTS

1. Abstract:

- Time series forecasting has been widely used to determine the future prices of stock, and the analysis and modelling of finance time series importantly guide investors' decisions and trades.

- This work proposes an intelligent time series prediction system that uses sliding-window optimization for the purpose of predicting the stock prices.

- The system has a graphical user interface and functions as a stand-alone application.

- The proposed model is a promising predictive technique for highly non-linear time series, whose patterns are difficult to capture by traditional models.

2. Introduction:

- Stock market prediction has been an active area of research for a long time. The Efficient Market Hypothesis (EMH) states that stock market prices are largely driven by new information and follow a random walk pattern.

- In this project, we test a hypothesis based on the premise of behave economics, that the emotions and moods of individuals affect their decision making process, thus, leading to a direct correlation between public sentiment and market sentiment.

- Financial markets are highly volatile and generate huge amounts of data daily.

- It is the most popular financial market instrument and its value changes quickly.

- Stock prices are predicted to determine the future value of companies’ stock or other financial instruments that are marketed on financial exchanges.

- However, the stock market is influenced by many factors such as political events, economic conditions and traders’ expectation.

2.1. What is Machine Learning:

- Machine Learning is the field of study that gives computers the ability to learn without being explicitly programmed.

- More formally, it can defined as,

    - A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measured by P, improves with experience E.

    - Example: playing checkers.

      E = the experience of playing many games of checkers

      T = the task of playing checkers.

      P = the probability that the program will win the next game.

2.2. What is Deep Learning

- Deep Learning is an Artificial Intelligence function that imitates the working of the human brain in processing data and creating patterns for use in decision making.

- Deep Learning is a subset of Machine Learning in Artificial Intelligence that has networks capable of learning un-supervised from data i.e., unstructured or unlabeled.

- It is also known as Deep Neural Network or Deep Neural Learning that can be used in LSTM technique to analyze the raw data and to plot predicted result.

2.3.LSTM:

- Long Short Term Memory

- LSTM units or blocks are part of a recurrent neural network in deep learning.

- These artificial intelligence programs to more effectively imitate human thought.

3.EXISTING METHOD:

- Time series forecasting consists of a research area designed to solve various problems, mainly in the financial area.

- Support vector regression (SVR), a variant of the SVM, is typically used to solve nonlinear regression problems by constructing the input-output mapping function.

- Long Short Term Memory(LSTM) units or blocks are part of a recurrent neural network in deep learning.

- The Firefly Algorithm (FA), which is a nature-inspired met heuristic method, has recently performed extremely well in solving various optimization problems.

3.1. Disadvantages:

- The existing system focuses on the stock price market in Taiwan, but does not generalize for other markets worldwide.

- The system does not allow the import of raw data directly

- The existing system cannot be used to analyze multi-variate time series.

- Lastly, the system does not have a user-interface which can be distributed as a web app to users for personal use.

4.Proposed System:

- To generalize the application of the existing system, our work uses the system to estimate other stocks in similar emerging markets and mature markets.

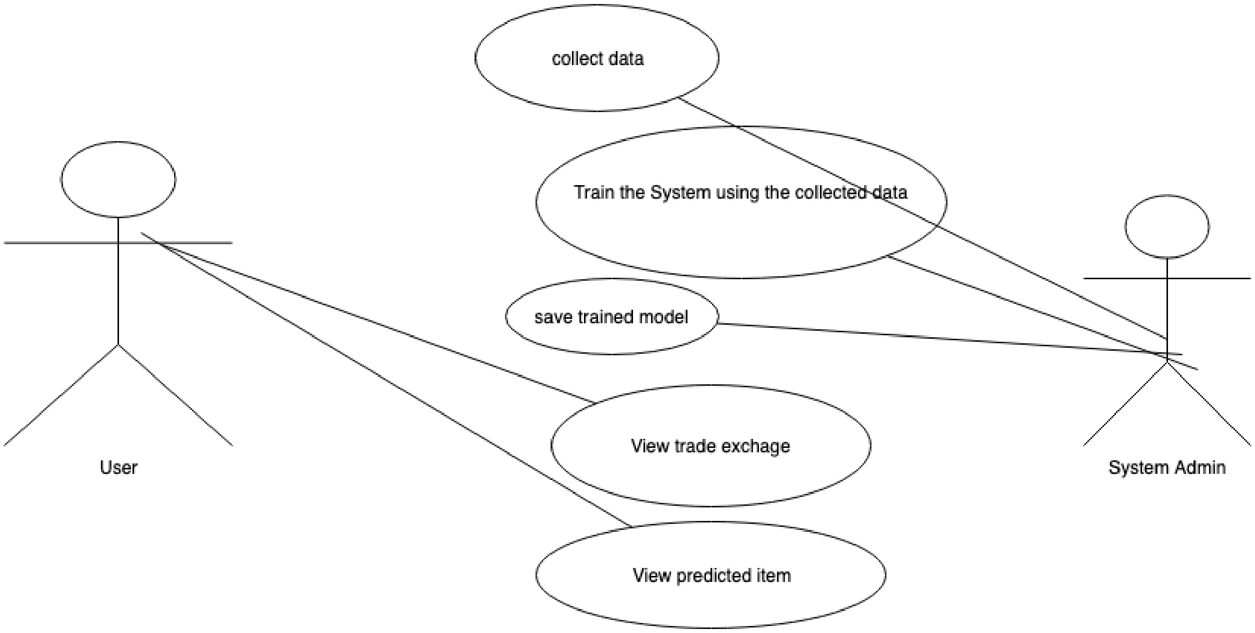
- The system can be extended to analyze multivariate time series data and import raw dataset directly.

- Profit can be maximized even when the corporate stock market is has lower value.

- The development of a web-based application has been considered to improve the user-friendliness and usability of the expert system.

5.System Design:

5.1. Use case diagram:



Stock market prediction using machine learning

- Data is initially collected from online sources or the stock exchange.

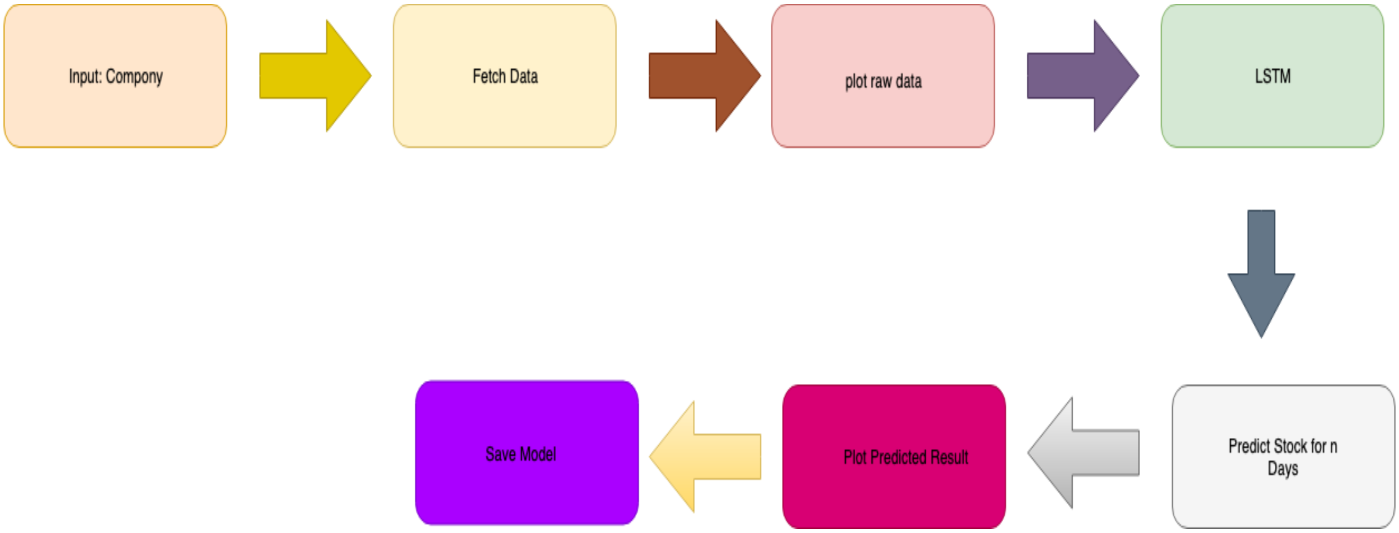
- The data is then used to train the system.

- Trained model is saved.

- User view the trained exchange and stock of companies.

- Using the model, closing prices are predicted.

5.2. Data flow diagram:



6. Implementation:

6.1 program/Algorithm:

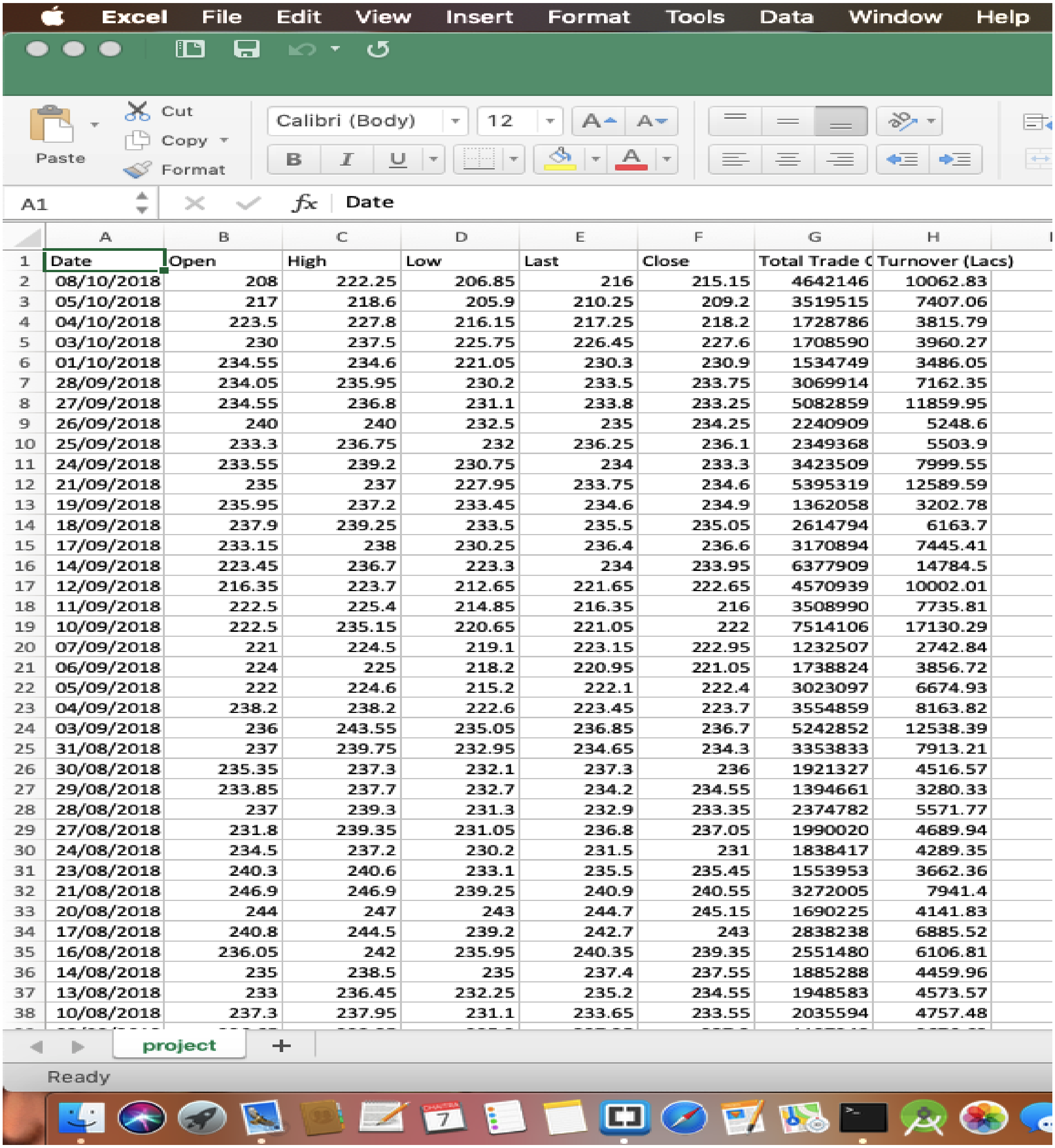
```
import pandas as pd
import numpy as np
from keras.models import Sequential
from keras.layers import Dense, Dropout, LSTM



#to plot within notebook
import matplotlib.pyplot as plt



#setting figure size
from matplotlib.pylab import rcParams
rcParams['figure.figsize'] = 20,10

#for normalizing data
from sklearn.preprocessing import MinMaxScaler
#scaler = MinMaxScaler(feature_range=(0, 1))

#read the file
df = pd.read_csv('project.csv')
```

```
data = df.sort_index(ascending = True,axis=0)
new_data=pd.DataFrame(index=range(0,len(df)),columns=['Date','Close'])
for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]

new_data.index = new_data.Date

new_data.drop('Date', axis=1, inplace=True)

#creating train and test sets
dataset = new_data.values

train = dataset[0:987,:]
valid = dataset[987:,:]

#converting dataset into x_train and y_train
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(dataset)

x_train, y_train = [], []
for i in range(60,len(train)):
    x_train.append(scaled_data[i-60:i,0])
    y_train.append(scaled_data[i,0])
x_train, y_train = np.array(x_train), np.array(y_train)
```

```
x_train= np.reshape(x_train, (x_train.shape[0],x_train.shape[1],1))

# create and fit the LSTM network
model = Sequential()
model.add(LSTM(units=50,
return_sequences=True, input_shape=(x_train.shape[1],1)))
model.add(LSTM(units=50))
model.add(Dense(1))

model.compile(loss='mean_squared_error', optimizer='adam')
model.fit(x_train, y_train, epochs=1, batch_size=1, verbose=2)

#predicting 246 values, using past 60 from the train data
inputs = new_data[len(new_data) - len(valid) - 60:].values
inputs = inputs.reshape(-1,1)
inputs  = scaler.transform(inputs)
X_test = []
for i in range(60,inputs.shape[0]):
    X_test.append(inputs[i-60:i,0])
X_test = np.array(X_test)

X_test = np.reshape(X_test, (X_test.shape[0],X_test.shape[1],1))
closing_price = model.predict(X_test)
closing_price = scaler.inverse_transform(closing_price)
rms=np.sqrt(np.mean(np.power((valid-closing_price),2)))
print(rms)
```

```
#for plotting
train = new_data[:987]
valid = new_data[987:]
valid['Predictions'] = closing_price
plt.plot(train['Close'])
plt.plot(valid[['Close','Predictions']])
```

6.2. Raw Data Set:

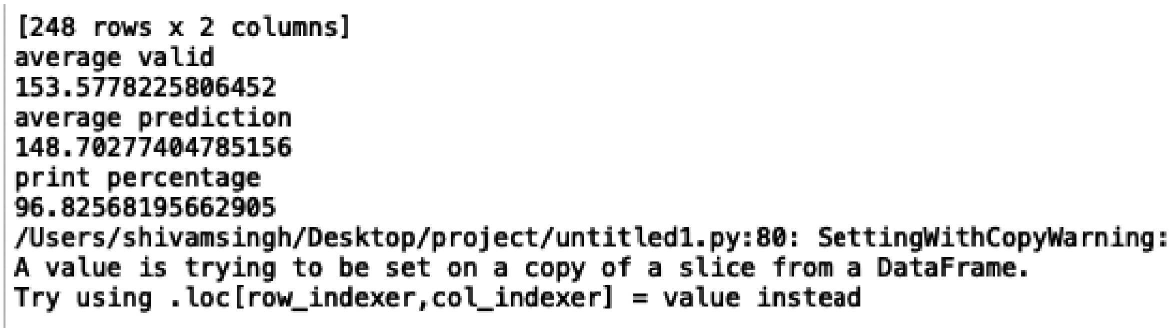


A1 fx Date

	A	B	C	D	E	F	G	H
1	Date	Open	High	Low	Last	Close	Total Trade (	Turnover (Lacs)
2	08/10/2018	208	222.25	206.85	216	215.15	4642146	10062.83
3	05/10/2018	217	218.6	205.9	210.25	209.2	3519515	7407.06
4	04/10/2018	223.5	227.8	216.15	217.25	218.2	1728786	3815.79
5	03/10/2018	230	237.5	225.75	226.45	227.6	1708590	3960.27
6	01/10/2018	234.55	234.6	221.05	230.3	230.9	1534749	3486.05
7	28/09/2018	234.05	235.95	230.2	233.5	233.75	3069914	7162.35
8	27/09/2018	234.55	236.8	231.1	233.8	233.25	5082859	11859.95
9	26/09/2018	240	240	232.5	235	234.25	2240909	5248.6
10	25/09/2018	233.3	236.75	232	236.25	236.1	2349368	5503.9
11	24/09/2018	233.55	239.2	230.75	234	233.3	3423509	7999.55
12	21/09/2018	235	237	227.95	233.75	234.6	5395319	12589.59
13	19/09/2018	235.95	237.2	233.45	234.6	234.9	1362058	3202.78
14	18/09/2018	237.9	239.25	233.5	235.5	235.05	2614794	6163.7
15	17/09/2018	233.15	238	230.25	236.4	236.6	3170894	7445.41
16	14/09/2018	223.45	236.7	223.3	234	233.95	6377909	14784.5
17	12/09/2018	216.35	223.7	212.65	221.65	222.65	4570939	10002.01
18	11/09/2018	222.5	225.4	214.85	216.35	216	3508990	7735.81
19	10/09/2018	222.5	235.15	220.65	221.05	222	7514106	17130.29
20	07/09/2018	221	224.5	219.1	223.15	222.95	1232507	2742.84
21	06/09/2018	224	225	218.2	220.95	221.05	1738824	3856.72
22	05/09/2018	222	224.6	215.2	222.1	222.4	3023097	6674.93
23	04/09/2018	238.2	238.2	222.6	223.45	223.7	3554859	8163.82
24	03/09/2018	236	243.55	235.05	236.85	236.7	5242852	12538.39
25	31/08/2018	237	239.75	232.95	234.65	234.3	3353833	7913.21
26	30/08/2018	235.35	237.3	232.1	237.3	236	1921327	4516.57
27	29/08/2018	233.85	237.7	232.7	234.2	234.55	1394661	3280.33
28	28/08/2018	237	239.3	231.3	232.9	233.35	2374782	5571.77
29	27/08/2018	231.8	239.35	231.05	236.8	237.05	1990020	4689.94
30	24/08/2018	234.5	237.2	230.2	231.5	231	1838417	4289.35
31	23/08/2018	240.3	240.6	233.1	235.5	235.45	1553953	3662.36
32	21/08/2018	246.9	246.9	239.25	240.9	240.55	3272005	7941.4
33	20/08/2018	244	247	243	244.7	245.15	1690225	4141.83
34	17/08/2018	240.8	244.5	239.2	242.7	243	2838238	6885.52
35	16/08/2018	236.05	242	235.95	240.35	239.35	2551480	6106.81
36	14/08/2018	235	238.5	235	237.4	237.55	1885288	4459.96
37	13/08/2018	233	236.45	232.25	235.2	234.55	1948583	4573.57
38	10/08/2018	237.3	237.95	231.1	233.65	233.55	2035594	4757.48

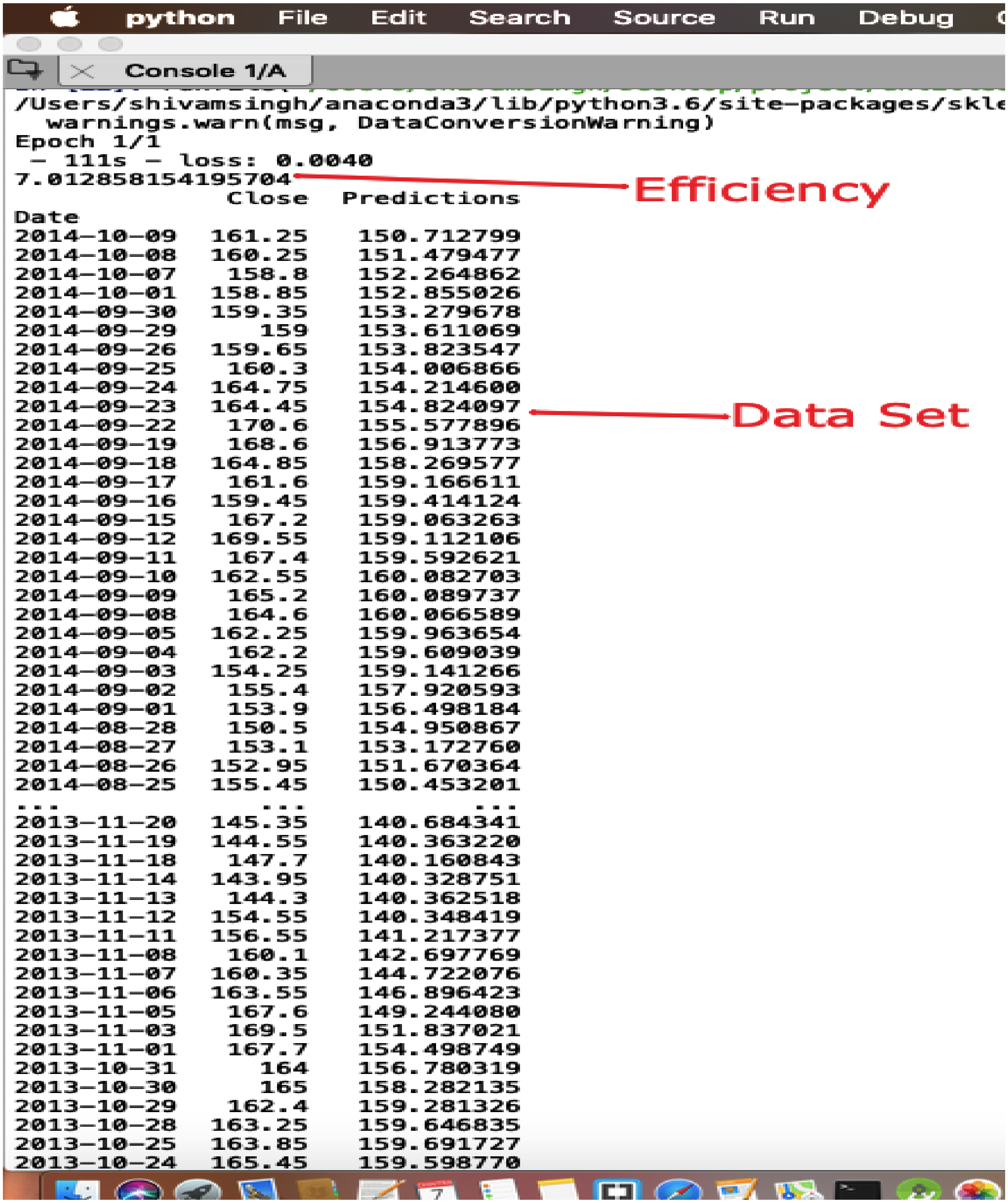
7. Result and Discussion:

7.1. Average Close value, Average predicted value And Efficiency (in percentage) :



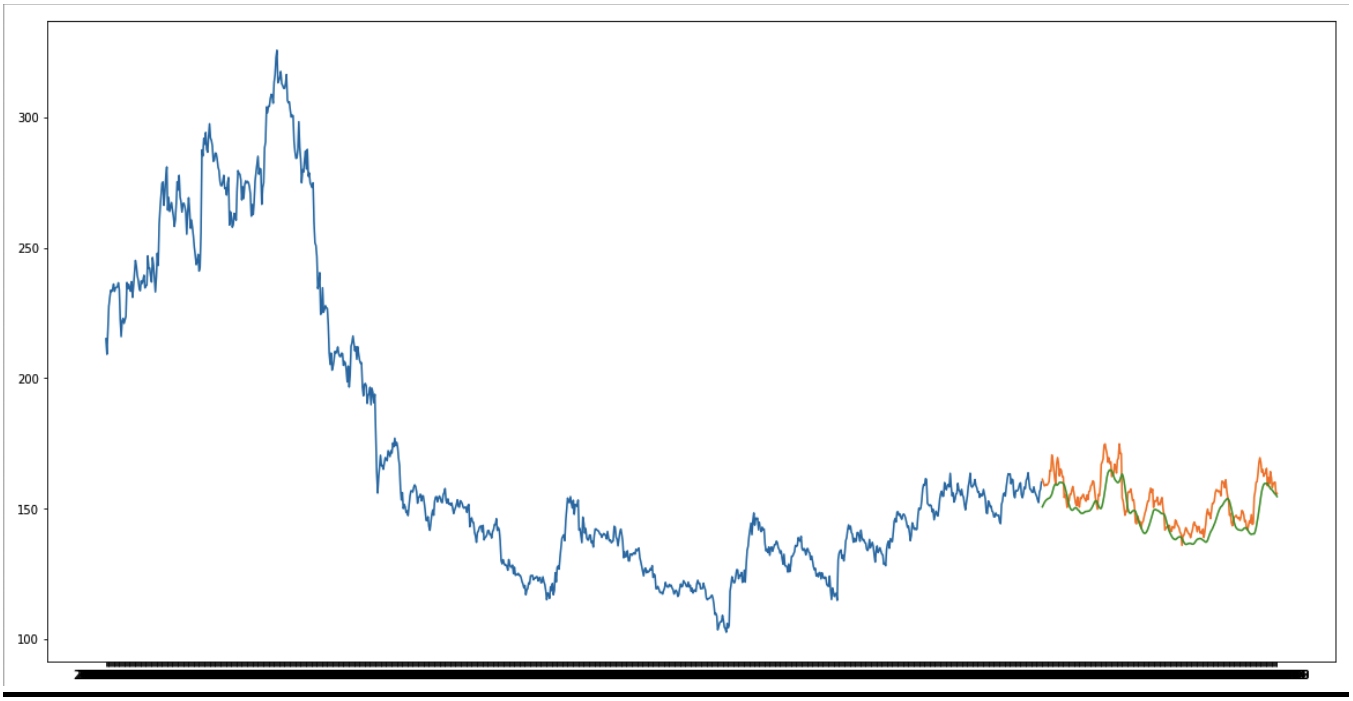
```
[248 rows x 2 columns]
average valid
153.5778225806452
average prediction
148.70277404785156
print percentage
96.82568195662905
/Users/shivamsingh/Desktop/project/untitled1.py:80: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead
```

7.2. Data After Prepressing And Root Mean Square Value :



```
/Users/shivamsingh/anaconda3/lib/python3.6/site-packages/skle
  warnings.warn(msg, DataConversionWarning)
Epoch 1/1
 - 111s - loss: 0.0040
7.012858154195704
                   Close   Predictions
Date
2014-10-09   161.25    150.712799
2014-10-08   160.25    151.479477
2014-10-07    158.8    152.264862
2014-10-01   158.85    152.855026
2014-09-30   159.35    153.279678
2014-09-29      159    153.611069
2014-09-26   159.65    153.823547
2014-09-25    160.3    154.006866
2014-09-24   164.75    154.214600
2014-09-23   164.45    154.824097
2014-09-22    170.6    155.577896
2014-09-19    168.6    156.913773
2014-09-18   164.85    158.269577
2014-09-17    161.6    159.166611
2014-09-16   159.45    159.414124
2014-09-15    167.2    159.063263
2014-09-12   169.55    159.112106
2014-09-11    167.4    159.592621
2014-09-10   162.55    160.082703
2014-09-09    165.2    160.089737
2014-09-08    164.6    160.066589
2014-09-05   162.25    159.963654
2014-09-04    162.2    159.609039
2014-09-03   154.25    159.141266
2014-09-02    155.4    157.920593
2014-09-01    153.9    156.498184
2014-08-28    150.5    154.950867
2014-08-27    153.1    153.172760
2014-08-26   152.95    151.670364
2014-08-25   155.45    150.453201
...             ...           ...
2013-11-20   145.35    140.684341
2013-11-19   144.55    140.363220
2013-11-18    147.7    140.160843
2013-11-14   143.95    140.328751
2013-11-13    144.3    140.362518
2013-11-12   154.55    140.348419
2013-11-11   156.55    141.217377
2013-11-08    160.1    142.697769
2013-11-07   160.35    144.722076
2013-11-06   163.55    146.896423
2013-11-05    167.6    149.244080
2013-11-03    169.5    151.837021
2013-11-01    167.7    154.498749
2013-10-31      164    156.780319
2013-10-30      165    158.282135
2013-10-29    162.4    159.281326
2013-10-28   163.25    159.646835
2013-10-25   163.85    159.691727
2013-10-24   165.45    159.598770
```

7.3. Performance via Graph:



- In this graph blue lines are representing the “**Training Data**”.

- Green lines representing the “**Actual Stock**” these are taken from last 246 rows from our data set file (project.csv).

- Yellow lines in the Graph represent the “**predicted Future Stock**”.

- In this we got **Accuracy of 96.8** %.

8.Future Enhancement

- The limitation of the proposed system is its computational speed, especially with respect to sliding-window validation as the computational cost increases with the number of forward day predictions.

- The proposed model does not predict well for sudden changes in the trend of stock data.

- This occurs due to external factors and real-world changes affecting the stock market.

- We can overcome this by implementing Sentiment Analysis and Neural Networks to enhance the proposed model.

- We can modify the same system to an online-learning system that adapts in real-time.

9.Conclusion:

- Thus, as we can see above in our proposed method, we train the data using existing stock dataset that is available. We use this data to predict and forecast the stock price of n-days into the future.

- The average performance of the model decreases with increase in number of days, due to unpredictable changes in trend.

- The current system can update its training set as each day passes so as to detect newer trends and behave like an online-learning system that predicts stock in real-time.

8: REFERENCES –

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www.wikipedia.org

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www.datacamp.com

www.youtube.com

www.stackoverflow.com

https://anaconda.org/conda-forge/keras