Prediction_of_AirBnB's_Stock_Price_Value

March 24, 2023

```
[ ]: import pandas as pd
     import numpy as np
     import seaborn as sns
     from datetime import datetime
     import matplotlib.pyplot as plt
     sns.set_style("whitegrid")
```

```
[ ]: # importing the dataset
     ABNB="https://raw.githubusercontent.com/ukantjadia/30-days-of-Mahcine-Learning/
       ↪Main/DAY-01/ABNB.csv"
     df = pd.read_csv(ABNB)
```

```
[ ]: # Summary Stats

     df.describe()
```

```
[ ]:              Open        High         Low       Close   Adj Close  \
     count  454.000000  454.000000  454.000000  454.000000  454.000000
     mean   152.735925  156.465595  148.969855  152.729185  152.729185
     std     28.340932   29.107813   27.490223   28.226659   28.226659
     min     88.879997   91.459999   86.709999   89.080002   89.080002
     25%    136.821507  139.842495  132.920002  135.955002  135.955002
     50%    154.932495  159.099998  151.230004  155.654999  155.654999
     75%    172.556507  175.974998  168.595005  171.744996  171.744996
     max    216.240005  219.940002  209.089996  216.839996  216.839996

                  Volume
     count  4.540000e+02
     mean   6.690328e+06
     std    4.417387e+06
     min    1.995400e+06
     25%    4.114375e+06
     50%    5.450000e+06
     75%    7.631375e+06
     max    3.975500e+07
```

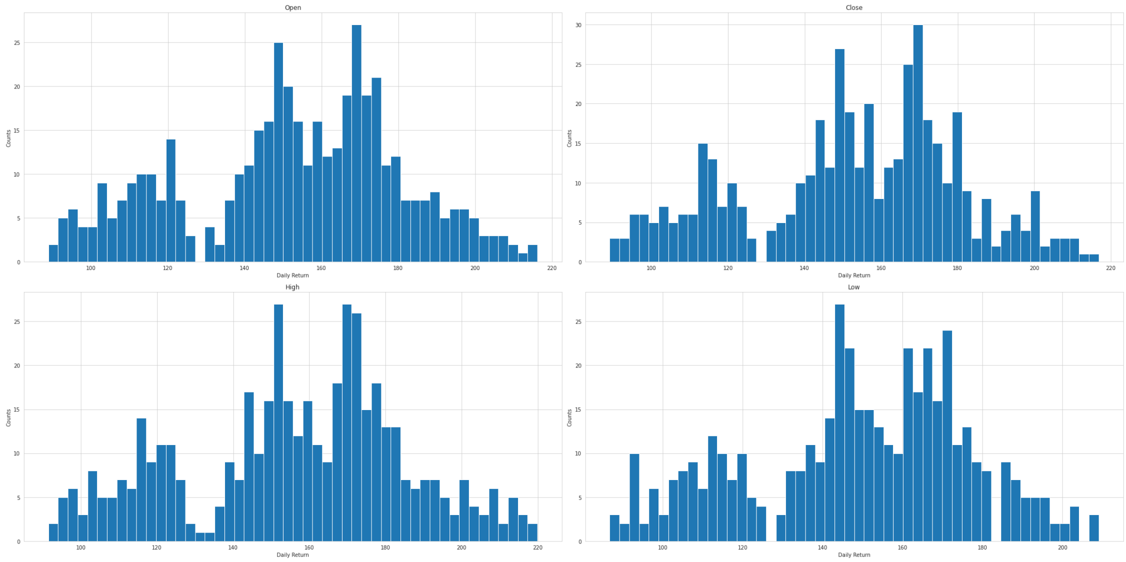
[ ]:

```
import plotly.graph_objs as go
fig = go.Figure([go.Ohlc(x=df['Date'],
                         open=df['Open'],
                         high=df['High'],
                         low=df['Low'],
                         close=df['Close'])])
fig.update(layout_xaxis_rangeslider_visible=True)
fig.show()
```

[ ]:

```
plt.figure(figsize=(30,15));
dff = ['Open','Close','High','Low']
for no,col in enumerate(dff,1):
  plt.subplot(2,2,no)
  df[str(col)].hist(bins=50)
  plt.xlabel('Daily Return')
  plt.ylabel('Counts')
  plt.title(f'{col}')

plt.tight_layout()
```



[ ]:

```
# Creating the dataframe of date formate and setting it to index
df['Date'] = pd.to_datetime(df['Date'])
df2 = df.set_index('Date')
df2.head()
```

[ ]:

```
                 Open        High         Low       Close   Adj Close  \
Date
2020-12-11  146.550003  151.500000  135.100006  139.250000  139.250000
```

```
2020-12-14  135.000000  135.300003  125.160004  130.000000  130.000000
2020-12-15  126.690002  127.599998  121.500000  124.800003  124.800003
2020-12-16  125.830002  142.000000  124.910004  137.990005  137.990005
2020-12-17  143.000000  152.449997  142.669998  147.050003  147.050003

              Volume
Date
2020-12-11  26980800
2020-12-14  16966100
2020-12-15  10914400
2020-12-16  20409600
2020-12-17  15054700
```

[ ]:

```python
def create_features_datetime(df):
    df['Year']=df.index.year
    df['Month']=df.index.month
    df['dow']=df.index.day_of_week

    return df
df_tr=create_features_datetime(df2)
df_tr.head()
```

[ ]:

```
                  Open        High         Low       Close   Adj Close  \
Date
2020-12-11  146.550003  151.500000  135.100006  139.250000  139.250000
2020-12-14  135.000000  135.300003  125.160004  130.000000  130.000000
2020-12-15  126.690002  127.599998  121.500000  124.800003  124.800003
2020-12-16  125.830002  142.000000  124.910004  137.990005  137.990005
2020-12-17  143.000000  152.449997  142.669998  147.050003  147.050003

              Volume  Year  Month  dow
Date
2020-12-11  26980800  2020     12    4
2020-12-14  16966100  2020     12    0
2020-12-15  10914400  2020     12    1
2020-12-16  20409600  2020     12    2
2020-12-17  15054700  2020     12    3
```

[ ]:

```python
X = df_tr.drop('Close',axis=1)
y = df_tr['Close']
print(X)
```

```
                  Open        High         Low   Adj Close    Volume  Year  \
Date
2020-12-11  146.550003  151.500000  135.100006  139.250000  26980800  2020
2020-12-14  135.000000  135.300003  125.160004  130.000000  16966100  2020
2020-12-15  126.690002  127.599998  121.500000  124.800003  10914400  2020
2020-12-16  125.830002  142.000000  124.910004  137.990005  20409600  2020
```

```
2020-12-17  143.000000  152.449997  142.669998  147.050003  15054700  2020
…                …           …           …           …          …    …
2022-09-26  101.779999  105.360001  101.559998  103.230003   5278800  2022
2022-09-27  106.040001  108.169998  104.139999  106.370003   5081000  2022
2022-09-28  106.700996  111.129997  105.779999  110.690002   4518200  2022
2022-09-29  109.190002  109.474998  105.169998  106.660004   4259500  2022
2022-09-30  104.760002  109.080002  104.730003  105.040001   4747800  2022

            Month  dow
Date
2020-12-11     12    4
2020-12-14     12    0
2020-12-15     12    1
2020-12-16     12    2
2020-12-17     12    3
…           …   …
2022-09-26      9    0
2022-09-27      9    1
2022-09-28      9    2
2022-09-29      9    3
2022-09-30      9    4

[454 rows x 8 columns]
```

```
[ ]: # test size 20% and train size 80%

     from sklearn.model_selection import train_test_split
     from sklearn.metrics import accuracy_score
     X_train, X_test, y_train, y_test = train_test_split(X,y, test_size=0.
      ↪2,random_state=0)
     X_train, y_train = np.array(X_train), np.array(y_train)
     X_test, y_test = np.array(X_test),np.array(y_test)
     print(f"{y_test.shape} {X_test.shape}")
```

```
(91,) (91, 8)
```

```
[ ]: # Importing and creating the DecisionTreemodel

     from sklearn.tree import DecisionTreeRegressor
     dtree = DecisionTreeRegressor(random_state=0)
     dtree.fit(X_train, y_train)
```

```
[ ]: DecisionTreeRegressor(random_state=0)
```

```
[ ]: pred=dtree.predict(X)
     y_pred_prob_df = pd.DataFrame(data=pred, columns=['Close_predict'])
     df['Close_predict'] = y_pred_prob_df
     df
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/base.py:443: UserWarning:

X has feature names, but DecisionTreeRegressor was fitted without feature names
```

```
[ ]:          Date        Open        High         Low       Close   Adj Close  \
     0    2020-12-11  146.550003  151.500000  135.100006  139.250000  139.250000
     1    2020-12-14  135.000000  135.300003  125.160004  130.000000  130.000000
     2    2020-12-15  126.690002  127.599998  121.500000  124.800003  124.800003
     3    2020-12-16  125.830002  142.000000  124.910004  137.990005  137.990005
     4    2020-12-17  143.000000  152.449997  142.669998  147.050003  147.050003
     ..          …         …         …         …         …         …
     449  2022-09-26  101.779999  105.360001  101.559998  103.230003  103.230003
     450  2022-09-27  106.040001  108.169998  104.139999  106.370003  106.370003
     451  2022-09-28  106.700996  111.129997  105.779999  110.690002  110.690002
     452  2022-09-29  109.190002  109.474998  105.169998  106.660004  106.660004
     453  2022-09-30  104.760002  109.080002  104.730003  105.040001  105.040001

            Volume  Close_predict
     0    26980800     139.250000
     1    16966100     131.589996
     2    10914400     124.800003
     3    20409600     137.990005
     4    15054700     147.050003
     ..        …             …
     449   5278800     103.230003
     450   5081000     106.370003
     451   4518200     110.690002
     452   4259500     106.660004
     453   4747800     104.949997

     [454 rows x 8 columns]
```

1 Decision Tree Regressor

[ ]:

```python
from sklearn import metrics
import math
y_pred = dtree.predict(X_test)
mae = metrics.mean_absolute_error(y_test, y_pred)
mse = metrics.mean_squared_error(y_test, y_pred)
r2 = metrics.r2_score(y_test, y_pred)
rmse = math.sqrt(mse)
# accu = metrics.accuracy_score(y_test, y_pred)

print('MAE is {}'.format(mae))
print('MSE is {}'.format(mse))
print('R2 score is {}'.format(r2))
print('RMSE score is {}'.format(rmse))
# print('Accuracy score is {}'.format(accu*100))
```

```
MAE is 0.3470327142857169
MSE is 0.269499517831574
R2 score is 0.9996783892298543
RMSE score is 0.5191334296995079
```

2 Random Forest Regressor

[ ]:

```
from sklearn.ensemble import RandomForestRegressor
rf = RandomForestRegressor(random_state=0)
rf.fit(X_train, y_train)
```

[ ]:

```
RandomForestRegressor(random_state=0)
```

[ ]:

```
from sklearn import metrics
import math
y_pred = rf.predict(X_test)
mae = metrics.mean_absolute_error(y_test, y_pred)
mse = metrics.mean_squared_error(y_test, y_pred)
r2 = metrics.r2_score(y_test, y_pred)
rmse = math.sqrt(mse)

print('MAE is {}'.format(mae))
print('MSE is {}'.format(mse))
print('R2 score is {}'.format(r2))
print('RMSE score is {}'.format(rmse))
```

```
MAE is 0.29589454329670223
MSE is 0.2637844988276057
R2 score is 0.9996852093224394
RMSE score is 0.5135995510391396
```

[ ]:

[ ]:

3 Visualize Random Forest Regressor

[ ]:

```
pred_rdt=rf.predict(X)
y_pred_prob_df_rdt = pd.DataFrame(data=pred_rdt, columns=['Close_predict'])
df['Close_predict'] = y_pred_prob_df_rdt
df
```

```
/usr/local/lib/python3.8/dist-packages/sklearn/base.py:443: UserWarning:
```

```
X has feature names, but RandomForestRegressor was fitted without feature names
```

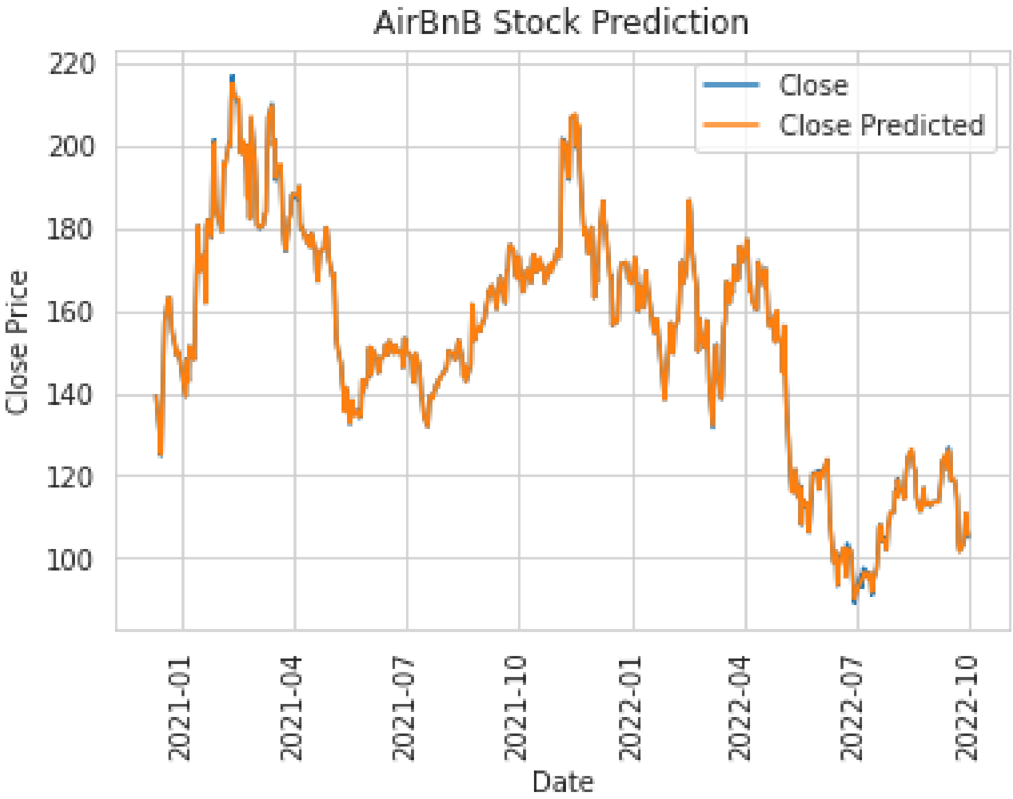
```
[ ]:          Date        Open        High         Low       Close   Adj Close  \
     0   2020-12-11  146.550003  151.500000  135.100006  139.250000  139.250000
     1   2020-12-14  135.000000  135.300003  125.160004  130.000000  130.000000
     2   2020-12-15  126.690002  127.599998  121.500000  124.800003  124.800003
     3   2020-12-16  125.830002  142.000000  124.910004  137.990005  137.990005
     4   2020-12-17  143.000000  152.449997  142.669998  147.050003  147.050003
     ..         …           …           …           …          …           …
     449 2022-09-26  101.779999  105.360001  101.559998  103.230003  103.230003
     450 2022-09-27  106.040001  108.169998  104.139999  106.370003  106.370003
     451 2022-09-28  106.700996  111.129997  105.779999  110.690002  110.690002
     452 2022-09-29  109.190002  109.474998  105.169998  106.660004  106.660004
     453 2022-09-30  104.760002  109.080002  104.730003  105.040001  105.040001

            Volume  Close_predict
     0    26980800     139.164899
     1    16966100     130.719802
     2    10914400     125.152402
     3    20409600     136.527903
     4    15054700     146.952300
     ..        …             …
     449   5278800     103.366302
     450   5081000     106.500002
     451   4518200     110.838201
     452   4259500     106.787003
     453   4747800     105.485001

     [454 rows x 8 columns]
```

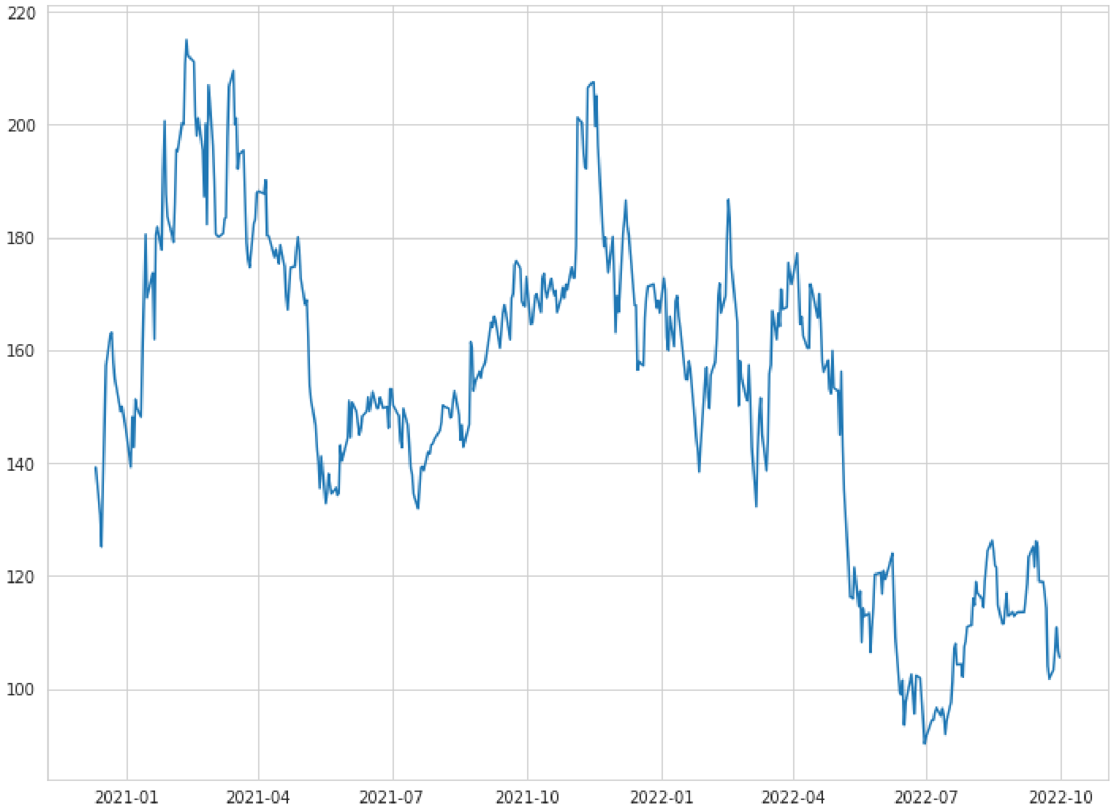
```
[ ]: Date = df['Date']
     Close = df['Close']
     Close2 = df['Close_predict']
```

```
[ ]: plt.plot (Date,Close, label='Close')
     plt.plot (Date,Close2, label='Close Predicted')
     plt.title ('AirBnB Stock Prediction')
     plt.xlabel ('Date')
     plt.ylabel ('Close Price')
     plt.legend(loc = 'upper right')
     plt.xticks(rotation=90)
     plt.show()
```



```
[ ]: plt.figure(figsize=(12,9))
     plt.subplot(1,1,1)
     plt.plot(Date,Close2,label='Close Predicted')
```

```
[ ]: [<matplotlib.lines.Line2D at 0x7fbe296f7a30>]
```


220
200
180
160
140
120
100
2021-01
2021-04
2021-07
2021-10
2022-01
2022-04
2022-07
2022-10