```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import datetime
```

```
dataset=pd.read_csv("ATOC Historical
Data.csv",index_col='Date',parse_dates=True)
```

```
dataset.head()
```

```
              Open    High     Low   Close  Volume
Date
2021-10-08  133.51  134.50  131.00  132.00  33.20K
2021-10-07  131.50  137.00  131.50  136.14  44.70K
2021-10-06  134.00  134.70  128.00  128.50  26.90K
2021-10-05  137.11  137.11  135.00  136.04  11.70K
2021-10-04  139.99  140.00  139.65  139.88   2.20K
```

```
dataset.isna().any()
```

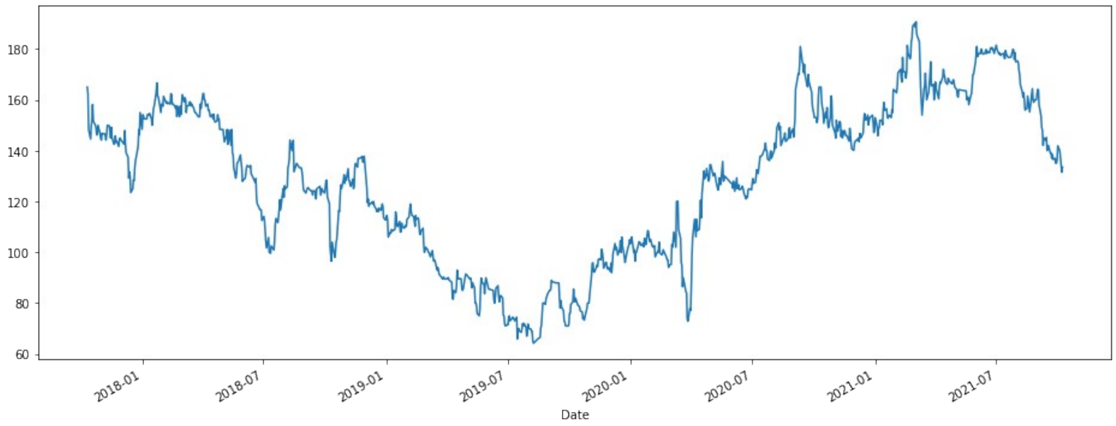
```
Open      False
High      False
Low       False
Close     False
Volume    False
dtype: bool
```

```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 984 entries, 2021-10-08 to 2017-10-11
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Open    984 non-null    float64
 1   High    984 non-null    float64
 2   Low     984 non-null    float64
 3   Close   984 non-null    float64
 4   Volume  984 non-null    object
dtypes: float64(4), object(1)
memory usage: 46.1+ KB
```

```
dataset['Open'].plot(figsize=(16,6))
```

```
<AxesSubplot:xlabel='Date'>
```



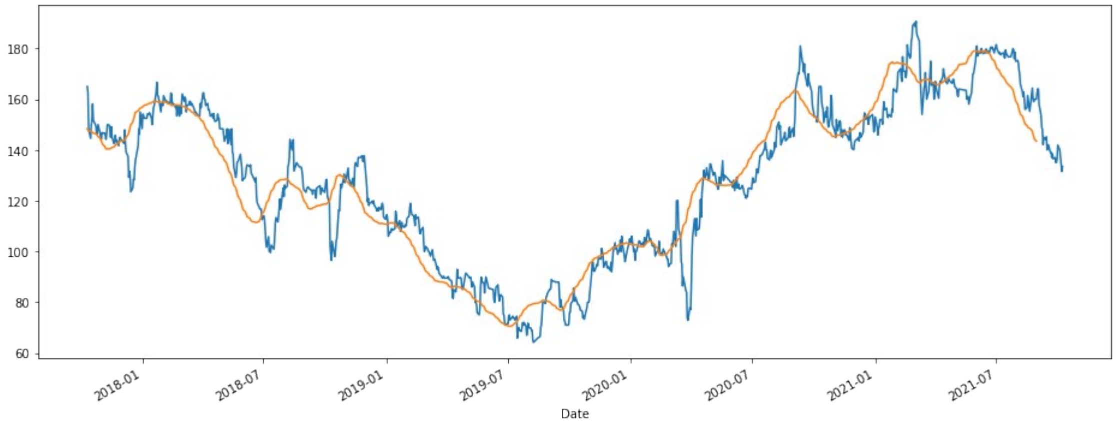
```
dataset['Volume']=dataset['Volume'].str.replace('K','')
dataset['Volume']=dataset['Volume'].str.replace('M','')
dataset['Volume']=dataset['Volume'].astype(float)
```

## Rolling Mean

```
rolling_mean=dataset.rolling(7).mean().head(20)
```

```
dataset['Open'].plot(figsize=(16,6))
dataset.rolling(window=30).mean()['Close'].plot()
```

```
<AxesSubplot:xlabel='Date'>
```

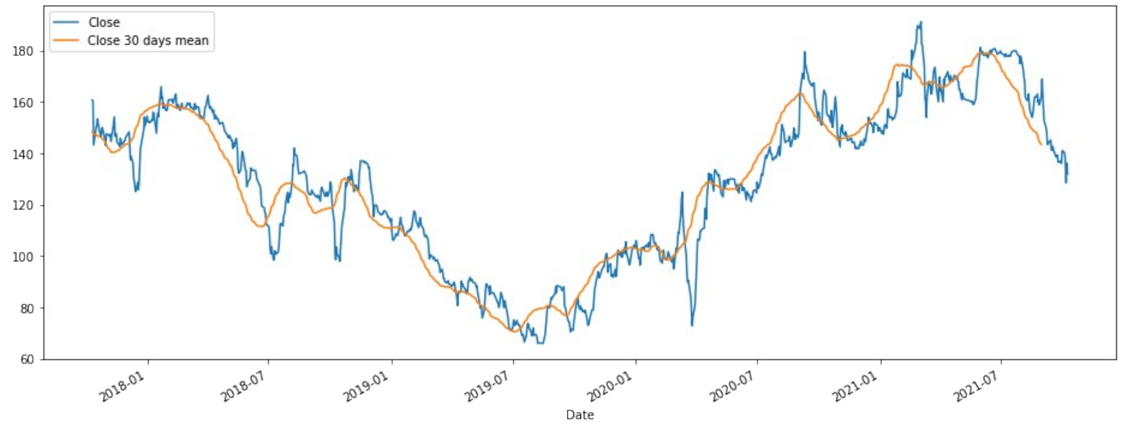


```
dataset['Cose 30 days
mean']=dataset['Close'].rolling(window=30).mean()
```

```
dataset.rename({'Cose 30 days mean':'Close 30 days
mean'},axis=1,inplace=True)
```

```
dataset[['Close','Close 30 days mean']].plot(figsize=(16,6))
```

```
<AxesSubplot:xlabel='Date'>
```



```
training_set=dataset['Open']
training_set=pd.DataFrame(training_set)
training_set.head()
```

```
              Open
Date
2021-10-08  133.51
2021-10-07  131.50
2021-10-06  134.00
2021-10-05  137.11
2021-10-04  139.99
```

### Feature Scaling

```
from sklearn.preprocessing import MinMaxScaler
sc=MinMaxScaler(feature_range=(0,1))
training_set_scaled=sc.fit_transform(training_set)
training_set_scaled
```

```
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       [0.6915356 ],
       [0.67817909],
       [0.63550146],
       [0.6651387 ],
       [0.77712795],
       [0.79680708]])
```

```
# 60 days for 1 output i.e output on every 60th day
x_train=[]
y_train=[]
for i in range(60,len(training_set)):
    x_train.append(training_set_scaled[i-60:i,0])
    y_train.append(training_set_scaled[i,0])
x_train=np.array(x_train)
y_trian=np.array(y_train)
```

```
x_train.shape
```

```
(924, 60)
```

```
# reshaping the data, to convert the data into 3 dimension
x_train=np.reshape(x_train,(x_train.shape[0],x_train.shape[1],1))
x_train.shape
```

```
(924, 60, 1)
```

```
# Building the RNN Model
```

```
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import LSTM
from keras.layers import Dropout
```

```
regressor= Sequential()
```

## Training the model

```
# input layer
regressor.add(LSTM(units=50,return_sequences=True,input_shape=(x_train
.shape[1],1)))
regressor.add(Dropout(0.2))
# droupout is regularization technique for reducing overitting the
model
```

```
regressor.add(LSTM(units=50,return_sequences=True))
regressor.add(Dropout(0.2))

regressor.add(LSTM(units=50,return_sequences=True))
regressor.add(Dropout(0.2))

regressor.add(LSTM(units=50))
regressor.add(Dropout(0.2))

regressor.add(Dense(units=1))

# compiling RNN
regressor.compile(optimizer='adam', loss="mean_squared_error")

# fiting RNN to training set
train_x = np.asarray(x_train)
train_y = np.asarray(y_train)
regressor.fit(train_x,train_y,epochs=100,batch_size=32)
# epochs---> frame of time
# batch_size=32 --> no. of training examples utilized in one iteration
```

```
Epoch 1/100
29/29 [==============================] - 5s 50ms/step - loss: 0.1219
Epoch 2/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0782
Epoch 3/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0714
Epoch 4/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0679
Epoch 5/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0669
Epoch 6/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0664
Epoch 7/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0664
Epoch 8/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0651
Epoch 9/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0653
Epoch 10/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0648
Epoch 11/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0640
Epoch 12/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0636
Epoch 13/100
29/29 [==============================] - 2s 56ms/step - loss: 0.0638
Epoch 14/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0634
```

```
Epoch 15/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0634
Epoch 16/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0630
Epoch 17/100
29/29 [==============================] - 2s 55ms/step - loss: 0.0625
Epoch 18/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0623
Epoch 19/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0620
Epoch 20/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0626
Epoch 21/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0621
Epoch 22/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0620
Epoch 23/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0620
Epoch 24/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0618
Epoch 25/100
29/29 [==============================] - 2s 57ms/step - loss: 0.0625
Epoch 26/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0618
Epoch 27/100
29/29 [==============================] - 2s 57ms/step - loss: 0.0621
Epoch 28/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0618
Epoch 29/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0619
Epoch 30/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0614
Epoch 31/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0614
Epoch 32/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0613
Epoch 33/100
29/29 [==============================] - 1s 49ms/step - loss: 0.0617
Epoch 34/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0612
Epoch 35/100
29/29 [==============================] - 1s 52ms/step - loss: 0.0612
Epoch 36/100
29/29 [==============================] - 1s 49ms/step - loss: 0.0615
Epoch 37/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0613
Epoch 38/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0615
Epoch 39/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0609
```

```
Epoch 40/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0610
Epoch 41/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0610
Epoch 42/100
29/29 [==============================] - 1s 48ms/step - loss: 0.0613
Epoch 43/100
29/29 [==============================] - 2s 55ms/step - loss: 0.0613
Epoch 44/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0609
Epoch 45/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0609
Epoch 46/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0611
Epoch 47/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0613
Epoch 48/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0615
Epoch 49/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0611
Epoch 50/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0612
Epoch 51/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0610
Epoch 52/100
29/29 [==============================] - 2s 54ms/step - loss: 0.0607
Epoch 53/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0610
Epoch 54/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0612
Epoch 55/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0609
Epoch 56/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0608
Epoch 57/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 58/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0610
Epoch 59/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0610
Epoch 60/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0615
Epoch 61/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0618
Epoch 62/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0608
Epoch 63/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 64/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0609
```

```
Epoch 65/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 66/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0606
Epoch 67/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0606
Epoch 68/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0609
Epoch 69/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 70/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0606
Epoch 71/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 72/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0608
Epoch 73/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0609
Epoch 74/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0609
Epoch 75/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 76/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 77/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0608
Epoch 78/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0608
Epoch 79/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0605
Epoch 80/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0606
Epoch 81/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0606
Epoch 82/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0605
Epoch 83/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0606
Epoch 84/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0606
Epoch 85/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0605
Epoch 86/100
29/29 [==============================] - 1s 50ms/step - loss: 0.0605
Epoch 87/100
29/29 [==============================] - 1s 52ms/step - loss: 0.0607
Epoch 88/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 89/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0606
```

```
Epoch 90/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 91/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0605
Epoch 92/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0605
Epoch 93/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0605
Epoch 94/100
29/29 [==============================] - 2s 52ms/step - loss: 0.0606
Epoch 95/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0605
Epoch 96/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 97/100
29/29 [==============================] - 2s 53ms/step - loss: 0.0608
Epoch 98/100
29/29 [==============================] - 1s 52ms/step - loss: 0.0605
Epoch 99/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0607
Epoch 100/100
29/29 [==============================] - 1s 51ms/step - loss: 0.0606
```

```
<keras.callbacks.History at 0x7fab4d1d91f0>
```

### Prediction and Visualizations

```
dataset_test=pd.read_csv("test.csv",index_col='Date',parse_dates=True)
```

```
dataset_test.head()
```

```
              Open    High     Low   Close  Volume
Date
2021-11-10  132.00  134.00  131.40  131.99  14.60K
2021-11-09  137.11  137.11  131.25  131.25  65.40K
2021-11-08  138.17  142.00  138.00  139.75  30.20K
2021-11-05  141.50  144.00  138.10  139.80  47.60K
2021-11-04  140.00  141.98  139.05  139.15  17.60K
```

```
dataset_test.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 21 entries, 2021-11-10 to 2021-10-11
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Open    21 non-null     float64
 1   High    21 non-null     float64
 2   Low     21 non-null     float64
 3   Close   21 non-null     float64
 4   Volume  21 non-null     object
```

```
dtypes: float64(4), object(1)
memory usage: 1008.0+ bytes
```

```
dataset_test['Volume']=dataset_test['Volume'].str.replace('K','')
dataset_test['Volume']=dataset_test['Volume'].str.replace('M','')
dataset_test['Volume']=dataset_test['Volume'].astype(float)
```

```
test_set=dataset_test['Open']
test_set=pd.DataFrame(test_set)
```

```
test_set.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 21 entries, 2021-11-10 to 2021-10-11
Data columns (total 1 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Open    21 non-null     float64
dtypes: float64(1)
memory usage: 336.0 bytes
```

```
real_stock_price=dataset_test.iloc[:,1:2].values
```

```
test_set.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 21 entries, 2021-11-10 to 2021-10-11
Data columns (total 1 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Open    21 non-null     float64
dtypes: float64(1)
memory usage: 336.0 bytes
```

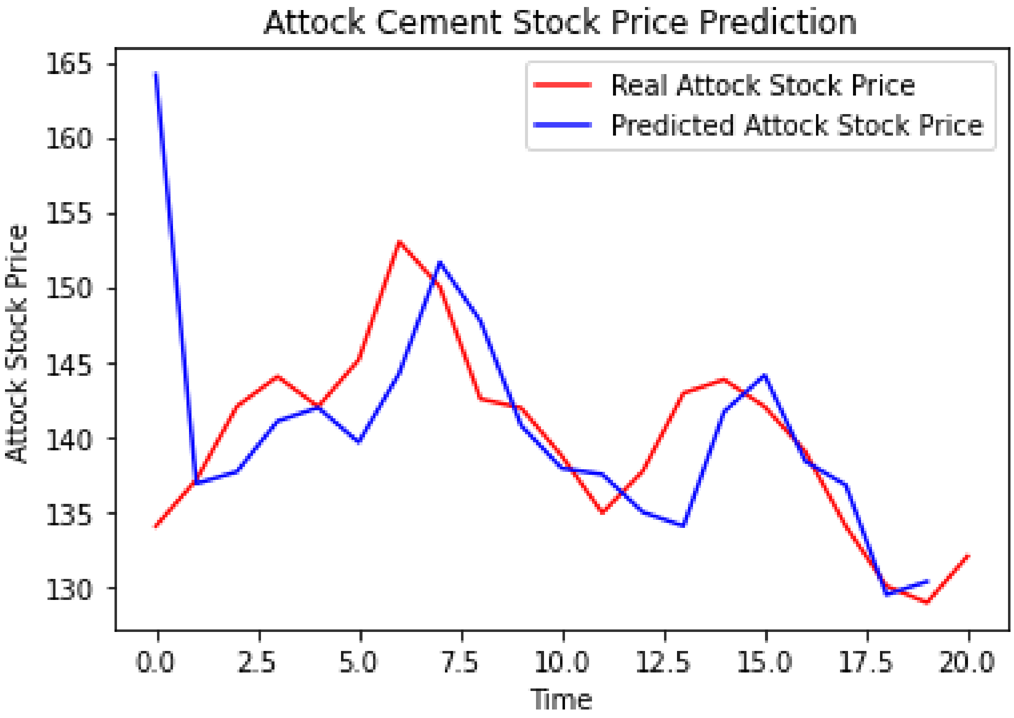
```
complete_dataset=pd.concat((dataset['Open'],dataset_test['Open']),axis
=0)
inputs=complete_dataset[len(complete_dataset)-len(dataset_test)-
60:].values
inputs=inputs.reshape(-1,1)
inputs=sc.transform(inputs)


X_test=[]
for i in range(60,80):
    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))
predicted_stock_price=regressor.predict(X_test)
predicted_stock_price=sc.inverse_transform(predicted_stock_price)
```

```
predicted_stock_price=pd.DataFrame(predicted_stock_price)
predicted_stock_price.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20 entries, 0 to 19
Data columns (total 1 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   0       20 non-null     float32
dtypes: float32(1)
memory usage: 208.0 bytes
```

### Visualization fo results

```
plt.plot(real_stock_price,color='red',label='Real Attock Stock Price')
plt.plot(predicted_stock_price,color='blue',label='Predicted Attock
Stock Price')
plt.title("Attock Cement Stock Price Prediction")
plt.xlabel("Time")
plt.ylabel("Attock Stock Price")
plt.legend()
plt.show()
```


Attock Cement Stock Price Prediction
Real Attock Stock Price
Predicted Attock Stock Price
Attock Stock Price
Time