Lets Grow More Internship December-2022

Done by Arnab Pal

Stock Market Prediction and Forecasting Using Stacked LSTM

Using Keras and Tensorflow

In [14]:

```
import pandas as pd
import numpy as np
import math
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler
from sklearn.metrics import mean_squared_error
import tensorflow as tf
from tensorflow.python.keras.models import Sequential
from tensorflow.python.keras.layers import Dense
from tensorflow.python.keras.layers import LSTM
%matplotlib inline
```

In [15]:

```
df = pd.read_csv('Reliance.csv')
df = df.dropna()
df.head()
```

Out[15]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	2015-11-18	463.799988	465.649994	454.975006	456.000000	436.671021	5142766.0
1	2015-11-19	459.450012	469.350006	458.625000	467.375000	447.563873	5569752.0
2	2015-11-20	467.000000	476.399994	462.774994	473.424988	453.357422	5167930.0
3	2015-11-23	475.000000	478.950012	473.100006	476.875000	456.661224	4800026.0
4	2015-11-24	476.500000	485.799988	475.524994	483.850006	463.340515	6768886.0

In [16]:

```
df.tail()
```

Out[16]:

	Date	Open	High	Low	Close	Adj Close	Volume
1228	2020-11-10	2077.0	2090.000000	2041.199951	2084.550049	2084.550049	17045147.0
1229	2020-11-11	2089.0	2095.000000	1978.099976	1997.199951	1997.199951	26178477.0
1230	2020-11-12	1981.0	2008.449951	1965.000000	1980.000000	1980.000000	18481466.0
1231	2020-11-13	1982.0	2036.650024	1981.750000	1996.400024	1996.400024	20946864.0
1232	2020-11-17	2085.0	2085.000000	1985.000000	1993.250000	1993.250000	21479385.0

In [17]:

```
df_close = df['Close']
```

In [18]:

```
df_close.shape
```

Out[18]:

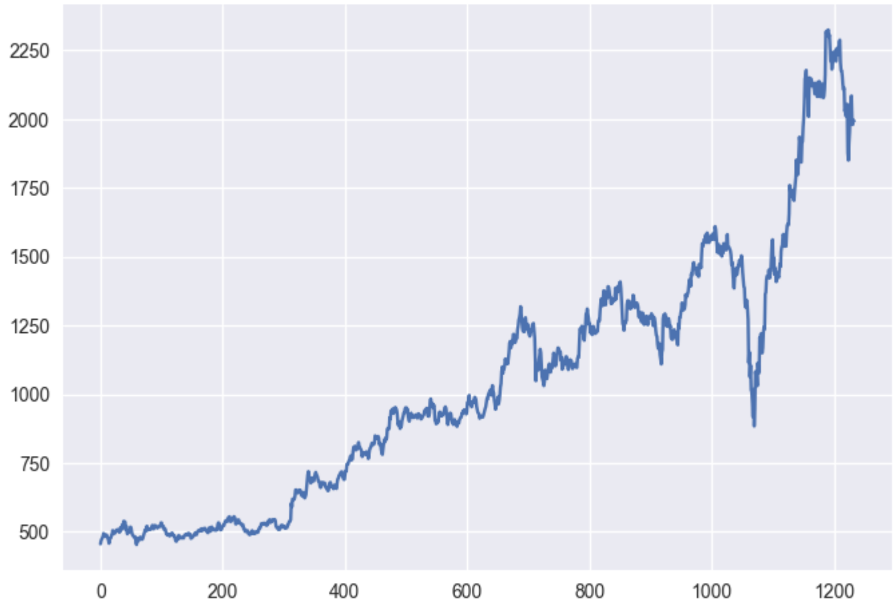
```
(1232,)
```

In [19]:

```
plt.plot(df_close)
```

Out[19]:

```
[<matplotlib.lines.Line2D at 0x2cafd568730>]
```



In [20]:

```
scaler = MinMaxScaler(feature_range = (0,1))
df_close = scaler.fit_transform(np.array(df_close).reshape(-1,1))
```

In [21]:

```
df_close.shape
```

Out[21]:

```
(1232, 1)
```

In [22]:

```
df_close
```

Out[22]:

```
array([[0.00145623],
       [0.00753497],
       [0.01076806],
       ...,
       [0.81587418],
       [0.82463827],
       [0.82295492]])
```

In [24]:

```
training_size = int(len(df_close) * 0.75)
test_size = len(df_close) - training_size
train_data, test_data = df_close[0:training_size,:], df_close[training_size:len(df_close),:1]
```

In [25]:

```
def create_dataset(dataset, time_step = 1):
    dataX, dataY = [], []
    for i in range(len(dataset) - time_step - 1):
        a = dataset[i:(i+time_step), 0]
        dataX.append(a)
        dataY.append(dataset[i+time_step, 0])
    return np.array(dataX), np.array(dataY)
```

In [26]:

```
time_step = 100
x_train, y_train = create_dataset(train_data, time_step)
x_test, y_test = create_dataset(test_data, time_step)
```

In [27]:

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

In [28]:

```
model = Sequential()
model.add(LSTM(50, return_sequences = True, input_shape = (100,1)))
model.add(LSTM(50, return_sequences = True))
model.add(LSTM(50))
model.add(Dense(1))
model.compile(loss = 'mean_squared_error', optimizer = 'adam')
```

In [29]:

```
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
lstm (LSTM)                  (None, 100, 50)           10400     
_________________________________________________________________
lstm_1 (LSTM)                (None, 100, 50)           20200     
_________________________________________________________________
lstm_2 (LSTM)                (None, 50)                20200     
_________________________________________________________________
dense (Dense)                (None, 1)                 51        
=================================================================
Total params: 50,851
Trainable params: 50,851
Non-trainable params: 0
_________________________________________________________________
```

In [30]:

```
model.fit(x_train, y_train, validation_data = (x_test, y_test), epochs = 100, batch_size = 64, verbose = 1)
```

```
Epoch 1/100
13/13 [==============================] - 11s 274ms/step - loss: 0.0305 - val_loss: 0.0482
Epoch 2/100
13/13 [==============================] - 3s 199ms/step - loss: 0.0056 - val_loss: 0.0066
Epoch 3/100
13/13 [==============================] - 2s 191ms/step - loss: 0.0015 - val_loss: 0.0061
Epoch 4/100
13/13 [==============================] - 2s 190ms/step - loss: 8.2845e-04 - val_loss: 0.0061
Epoch 5/100
13/13 [==============================] - 2s 190ms/step - loss: 6.0113e-04 - val_loss: 0.0079
Epoch 6/100
13/13 [==============================] - 3s 196ms/step - loss: 5.5199e-04 - val_loss: 0.0073
Epoch 7/100
13/13 [==============================] - 3s 198ms/step - loss: 5.2339e-04 - val_loss: 0.0083
Epoch 8/100
13/13 [==============================] - 2s 191ms/step - loss: 5.6224e-04 - val_loss: 0.0098
Epoch 9/100
13/13 [==============================] - 3s 198ms/step - loss: 5.3550e-04 - val_loss: 0.0096
Epoch 10/100
13/13 [==============================] - 2s 191ms/step - loss: 4.9613e-04 - val_loss: 0.0088
```

In [31]:

```
train_predict = model.predict(x_train)
test_predict = model.predict(x_test)
```

In [32]:

```
train_predict = scaler.inverse_transform(train_predict)
test_predict = scaler.inverse_transform(test_predict)
```

In [33]:

```
math.sqrt(mean_squared_error(y_train, train_predict))
```

Out[33]:

```
932.7430545483975
```

In [34]:

```
math.sqrt(mean_squared_error(y_test, test_predict))
```

Out[34]:

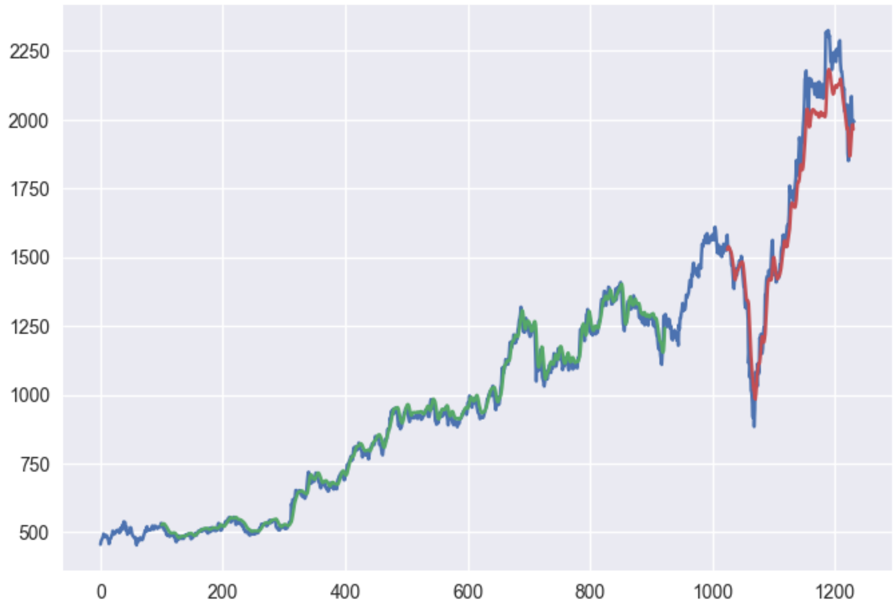
```
1709.0919959897458
```

In [35]:

```
look_back = 100
trainPredictPlot = np.empty_like(df_close)
trainPredictPlot[:,:] = np.nan
trainPredictPlot[look_back:len(train_predict) + look_back, :] = train_predict

#Shift test prediction for plotting
testPredictPlot = np.empty_like(df_close)
testPredictPlot[:,:] = np.nan
testPredictPlot[len(train_predict) + (look_back * 2)+1:len(df_close) - 1, :] = test_predict

#Plot baseline and predictions
plt.plot(scaler.inverse_transform(df_close))
plt.plot(trainPredictPlot)
plt.plot(testPredictPlot)
plt.show()
```



In [36]:

```
len(test_data), x_test.shape
```

Out[36]:

```
(308, (207, 100, 1))
```

In [37]:

```
x_input = test_data[207:].reshape(1,-1)
x_input.shape
```

Out[37]:

```
(1, 101)
```

In [38]:

```
temp_input = list(x_input)
temp_input = temp_input[0].tolist()
```

In [39]:

```
lst_output=[]
n_steps=100
nextNumberOfDays = 30
i=0

while(i<nextNumberOfDays):

    if(len(temp_input)>100):
        x_input=np.array(temp_input[1:])
        print("{} day input {}".format(i,x_input))
        x_input=x_input.reshape(1,-1)
        x_input = x_input.reshape((1, n_steps, 1))
        yhat = model.predict(x_input, verbose=0)
        print("{} day output {}".format(i,yhat))
        temp_input.extend(yhat[0].tolist())
        temp_input=temp_input[1:]
        lst_output.extend(yhat.tolist())
        i=i+1
    else:
        x_input = x_input.reshape((1, n_steps,1))
        yhat = model.predict(x_input, verbose=0)
        print(yhat[0])
        temp_input.extend(yhat[0].tolist())
        print(len(temp_input))
        lst_output.extend(yhat.tolist())
        i=i+1


print(lst_output)
```

```
0 day input [0.67861484 0.66843459 0.68633683 0.69849431 0.71321692 0.74736477
 0.73221462 0.7186143  0.73264216 0.76139264 0.79182641 0.7822073
 0.74319647 0.74287584 0.77937498 0.78375706 0.81135857 0.82869966
 0.85745014 0.90466386 0.91003455 0.92152404 0.8782113  0.88473103
 0.86242004 0.83137164 0.90704202 0.8941363  0.8982245  0.9048242
 0.89060937 0.89806416 0.89475093 0.89178502 0.88737626 0.87537912
 0.88991463 0.89686177 0.87842514 0.87030236 0.8777304  0.87043596
 0.89993454 0.88566622 0.88863201 0.86968773 0.87318804 0.89507149
 0.88646781 0.86784409 0.87072978 0.88379584 0.91278677 0.99436211
 0.99743488 0.98824331 0.99695397 1.         0.98621258 0.9899266
 0.96328709 0.93939953 0.94990047 0.92339443 0.93434952 0.942125
 0.9575156  0.9517976  0.94693455 0.93996067 0.93897212 0.96416879
 0.95441608 0.95131656 0.95324044 0.97656673 0.98020064 0.93691465
 0.92050875 0.92072245 0.90987421 0.89314775 0.8837156  0.88697546
 0.84211296 0.84499871 0.83268088 0.84093732 0.85568661 0.76107195
 0.74661661 0.78017657 0.80251431 0.84213971 0.85365588 0.8717452
 0.82506575 0.81587418 0.82463827 0.82295492]
0 day output [[0.79051095]]
1 day input [0.66843459 0.68633683 0.69849431 0.71321692 0.74736477 0.73221462
```

In [40]:

```
day_new = np.arange(1,101)
day_pred = np.arange(101,131)
```

In [41]:

```
df3 = df_close.tolist()
df3.extend(lst_output)
len(df_close)
```

Out[41]:

```
1232
```

In [ ]: