Virtual Internship Program

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Beginer Level Tasks

#Task 2 -Stock Market Prediction And Forecasting Using Stacked LSTM

Datasetlinks:¶ https://raw.githubusercontent.com/mwitiderrick/stockprice/master/NSE-TATAGLOBAL.csv

Import Libraries

```
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
```

Dataset

```
#Import dataset
df =
pd.read_csv('https://raw.githubusercontent.com/mwitiderrick/stockprice
/master/NSE-TATAGLOBAL.csv')
df=df. iloc[::-1]
df.head()
```

```
            Date    Open    High     Low    Last   Close  Total Trade
Quantity  \
2034  2010-07-21  122.1  123.00  121.05  121.10  121.55
```

```
658666
2033  2010-07-22  120.3  122.00  120.25  120.75  120.90
293312
2032  2010-07-23  121.8  121.95  120.25  120.35  120.65
281312
2031  2010-07-26  120.1  121.00  117.10  117.10  117.60
658440
2030  2010-07-27  117.6  119.50  112.00  118.80  118.65
586100
```

```
      Turnover (Lacs)
2034           803.56
2033           355.17
2032           340.31
2031           780.01
2030           694.98
```

```
df.tail()
```

```
         Date    Open    High     Low    Last   Close  Total Trade
Quantity  \
4  2018-09-24  233.55  239.20  230.75  234.00  233.30
3423509
3  2018-09-25  233.30  236.75  232.00  236.25  236.10
2349368
2  2018-09-26  240.00  240.00  232.50  235.00  234.25
2240909
1  2018-09-27  234.55  236.80  231.10  233.80  233.25
5082859
0  2018-09-28  234.05  235.95  230.20  233.50  233.75
3069914
```

```
   Turnover (Lacs)
4          7999.55
3          5503.90
2          5248.60
1         11859.95
0          7162.35
```

Data Pre-processing

```
df.isnull().sum()
```

```
Date                    0
Open                    0
High                    0
Low                     0
Last                    0
Close                   0
Total Trade Quantity    0
Turnover (Lacs)         0
dtype: int64
```

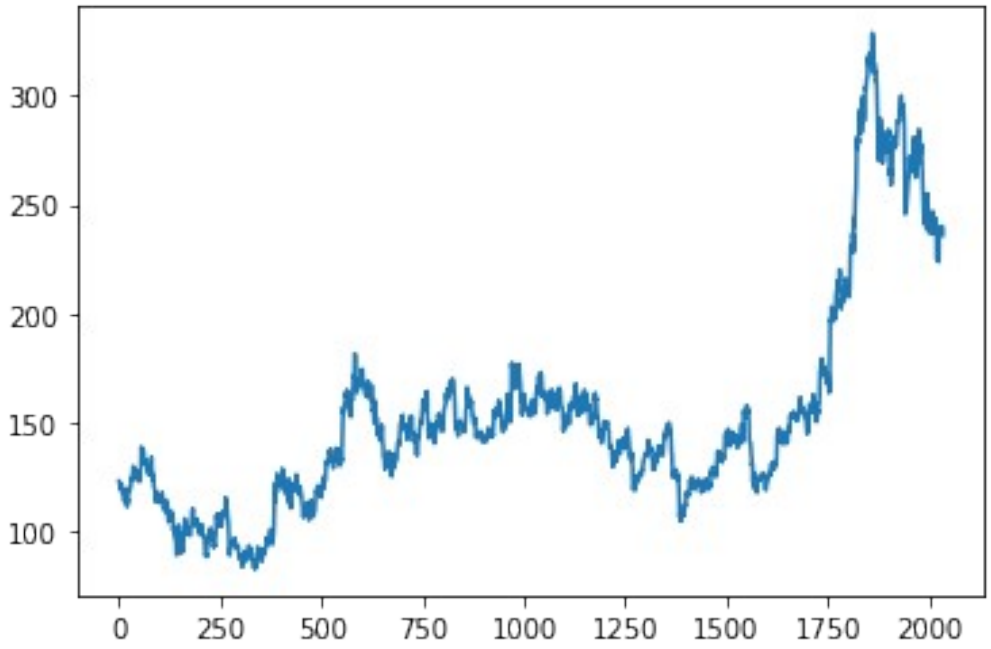
```
df.shape
```

```
(2035, 8)
```

```
df_high=df.reset_index()['High']
```

```
plt.plot(df_high)
```

```
[<matplotlib.lines.Line2D at 0x7f848da60ad0>]
```



Since LSTM are sensitive to the scale of the data, so we apply MinMax Scaler to transform our values between 0 and 1

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

```
df_high.shape
```

```
(2035, 1)
```

```
df_high
```

```
array([[0.16344786],
       [0.15938199],
       [0.15917869],
       ...,
       [0.6391543 ],
       [0.62614353],
       [0.62268754]])
```

```
#caterozied  the data into train and test.
training_size = int(len(df_high) * 0.75)
```

```
test_size = len(df_high) - training_size
train_data, test_data = df_high[0:training_size,:],
df_high[training_size:len(df_high),:1]

training_size,test_size
```

```
(1526, 509)
```

```
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)

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

#Reshape the input to be [samples, time steps, features]
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)

print(x_train.shape), print(y_train.shape)
```

```
(1425, 100, 1)
(1425,)
```

```
(None, None)
```

```
print(x_test.shape), print(y_test.shape)
```

```
(408, 100, 1)
(408,)
```

```
(None, None)
```

LSTM Model

```
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')

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
_________________________________________________________________
```

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

```
Epoch 1/100
23/23 [==============================] - 18s 403ms/step - loss: 0.0085
- val_loss: 0.0212
Epoch 2/100
23/23 [==============================] - 8s 365ms/step - loss: 0.0015
- val_loss: 0.0055
Epoch 3/100
23/23 [==============================] - 10s 421ms/step - loss:
7.9977e-04 - val_loss: 0.0046
Epoch 4/100
23/23 [==============================] - 9s 370ms/step - loss:
7.6949e-04 - val_loss: 0.0039
Epoch 5/100
23/23 [==============================] - 8s 365ms/step - loss:
7.4464e-04 - val_loss: 0.0046
Epoch 6/100
23/23 [==============================] - 8s 363ms/step - loss:
7.1688e-04 - val_loss: 0.0042
Epoch 7/100
23/23 [==============================] - 8s 364ms/step - loss:
6.9424e-04 - val_loss: 0.0051
Epoch 8/100
23/23 [==============================] - 9s 371ms/step - loss:
6.7014e-04 - val_loss: 0.0033
Epoch 9/100
23/23 [==============================] - 8s 363ms/step - loss:
6.4282e-04 - val_loss: 0.0062
Epoch 10/100
23/23 [==============================] - 9s 407ms/step - loss:
6.1959e-04 - val_loss: 0.0049
Epoch 11/100
23/23 [==============================] - 8s 366ms/step - loss:
6.5680e-04 - val_loss: 0.0069
Epoch 12/100
```

```
23/23 [==============================] - 8s 365ms/step - loss:
6.1469e-04 - val_loss: 0.0062
Epoch 13/100
23/23 [==============================] - 8s 364ms/step - loss:
6.0507e-04 - val_loss: 0.0088
Epoch 14/100
23/23 [==============================] - 8s 368ms/step - loss:
5.3483e-04 - val_loss: 0.0079
Epoch 15/100
23/23 [==============================] - 9s 374ms/step - loss:
5.4737e-04 - val_loss: 0.0116
Epoch 16/100
23/23 [==============================] - 9s 371ms/step - loss:
5.4107e-04 - val_loss: 0.0051
Epoch 17/100
23/23 [==============================] - 8s 368ms/step - loss:
5.2197e-04 - val_loss: 0.0093
Epoch 18/100
23/23 [==============================] - 9s 409ms/step - loss:
4.7987e-04 - val_loss: 0.0098
Epoch 19/100
23/23 [==============================] - 9s 374ms/step - loss:
4.9336e-04 - val_loss: 0.0054
Epoch 20/100
23/23 [==============================] - 8s 366ms/step - loss:
4.7103e-04 - val_loss: 0.0088
Epoch 21/100
23/23 [==============================] - 8s 366ms/step - loss:
4.7125e-04 - val_loss: 0.0093
Epoch 22/100
23/23 [==============================] - 8s 370ms/step - loss:
4.7283e-04 - val_loss: 0.0056
Epoch 23/100
23/23 [==============================] - 8s 368ms/step - loss:
4.2715e-04 - val_loss: 0.0069
Epoch 24/100
23/23 [==============================] - 8s 367ms/step - loss:
4.4385e-04 - val_loss: 0.0080
Epoch 25/100
23/23 [==============================] - 8s 366ms/step - loss:
4.0362e-04 - val_loss: 0.0056
Epoch 26/100
23/23 [==============================] - 8s 368ms/step - loss:
3.9356e-04 - val_loss: 0.0067
Epoch 27/100
23/23 [==============================] - 8s 365ms/step - loss:
3.7709e-04 - val_loss: 0.0042
Epoch 28/100
23/23 [==============================] - 8s 366ms/step - loss:
3.6870e-04 - val_loss: 0.0071
```

```
Epoch 29/100
23/23 [==============================] - 8s 367ms/step - loss:
3.6933e-04 - val_loss: 0.0066
Epoch 30/100
23/23 [==============================] - 9s 375ms/step - loss:
3.4208e-04 - val_loss: 0.0063
Epoch 31/100
23/23 [==============================] - 10s 404ms/step - loss:
3.3533e-04 - val_loss: 0.0087
Epoch 32/100
23/23 [==============================] - 8s 370ms/step - loss:
3.3800e-04 - val_loss: 0.0074
Epoch 33/100
23/23 [==============================] - 8s 368ms/step - loss:
3.2803e-04 - val_loss: 0.0055
Epoch 34/100
23/23 [==============================] - 8s 364ms/step - loss:
3.0602e-04 - val_loss: 0.0041
Epoch 35/100
23/23 [==============================] - 8s 365ms/step - loss:
2.8674e-04 - val_loss: 0.0044
Epoch 36/100
23/23 [==============================] - 8s 367ms/step - loss:
2.7024e-04 - val_loss: 0.0047
Epoch 37/100
23/23 [==============================] - 9s 382ms/step - loss:
2.6907e-04 - val_loss: 0.0048
Epoch 38/100
23/23 [==============================] - 9s 371ms/step - loss:
2.5052e-04 - val_loss: 0.0033
Epoch 39/100
23/23 [==============================] - 8s 364ms/step - loss:
2.4939e-04 - val_loss: 0.0024
Epoch 40/100
23/23 [==============================] - 9s 370ms/step - loss:
2.4354e-04 - val_loss: 0.0032
Epoch 41/100
23/23 [==============================] - 8s 368ms/step - loss:
2.4038e-04 - val_loss: 0.0030
Epoch 42/100
23/23 [==============================] - 9s 376ms/step - loss:
2.2466e-04 - val_loss: 0.0032
Epoch 43/100
23/23 [==============================] - 8s 369ms/step - loss:
2.0788e-04 - val_loss: 0.0037
Epoch 44/100
23/23 [==============================] - 8s 367ms/step - loss:
1.9680e-04 - val_loss: 0.0034
Epoch 45/100
23/23 [==============================] - 8s 364ms/step - loss:
```

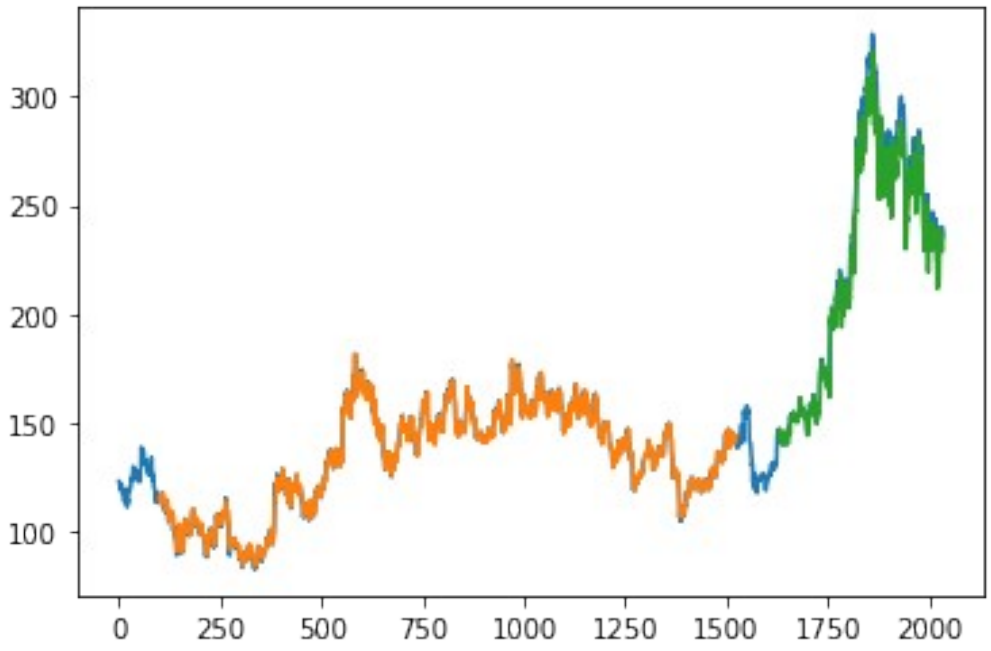
```
1.9696e-04 - val_loss: 0.0013
Epoch 46/100
23/23 [==============================] - 8s 366ms/step - loss:
1.8198e-04 - val_loss: 0.0065
Epoch 47/100
23/23 [==============================] - 9s 372ms/step - loss:
1.9710e-04 - val_loss: 0.0020
Epoch 48/100
23/23 [==============================] - 8s 366ms/step - loss:
1.7656e-04 - val_loss: 7.7668e-04
Epoch 49/100
23/23 [==============================] - 8s 370ms/step - loss:
2.2550e-04 - val_loss: 0.0057
Epoch 50/100
23/23 [==============================] - 8s 366ms/step - loss:
1.9184e-04 - val_loss: 0.0021
Epoch 51/100
23/23 [==============================] - 9s 374ms/step - loss:
1.9441e-04 - val_loss: 0.0022
Epoch 52/100
23/23 [==============================] - 8s 366ms/step - loss:
1.5938e-04 - val_loss: 0.0028
Epoch 53/100
23/23 [==============================] - 8s 363ms/step - loss:
1.5923e-04 - val_loss: 0.0018
Epoch 54/100
23/23 [==============================] - 9s 372ms/step - loss:
1.5425e-04 - val_loss: 0.0028
Epoch 55/100
23/23 [==============================] - 9s 374ms/step - loss:
1.7370e-04 - val_loss: 9.3282e-04
Epoch 56/100
23/23 [==============================] - 9s 375ms/step - loss:
1.7578e-04 - val_loss: 0.0012
Epoch 57/100
23/23 [==============================] - 9s 368ms/step - loss:
1.5774e-04 - val_loss: 0.0027
Epoch 58/100
23/23 [==============================] - 10s 422ms/step - loss:
1.4708e-04 - val_loss: 0.0033
Epoch 59/100
23/23 [==============================] - 9s 370ms/step - loss:
1.7980e-04 - val_loss: 0.0032
Epoch 60/100
23/23 [==============================] - 8s 368ms/step - loss:
1.5325e-04 - val_loss: 0.0017
Epoch 61/100
23/23 [==============================] - 9s 372ms/step - loss:
1.4325e-04 - val_loss: 7.7504e-04
Epoch 62/100
```

```
23/23 [==============================] - 8s 368ms/step - loss:
1.6306e-04 - val_loss: 0.0015
Epoch 63/100
23/23 [==============================] - 8s 367ms/step - loss:
1.3475e-04 - val_loss: 0.0025
Epoch 64/100
23/23 [==============================] - 9s 370ms/step - loss:
1.3905e-04 - val_loss: 0.0031
Epoch 65/100
23/23 [==============================] - 8s 366ms/step - loss:
1.3559e-04 - val_loss: 0.0011
Epoch 66/100
23/23 [==============================] - 8s 366ms/step - loss:
1.2643e-04 - val_loss: 0.0015
Epoch 67/100
23/23 [==============================] - 8s 370ms/step - loss:
1.2519e-04 - val_loss: 0.0012
Epoch 68/100
23/23 [==============================] - 8s 366ms/step - loss:
1.2526e-04 - val_loss: 0.0012
Epoch 69/100
23/23 [==============================] - 8s 365ms/step - loss:
1.2423e-04 - val_loss: 0.0021
Epoch 70/100
23/23 [==============================] - 8s 367ms/step - loss:
1.4048e-04 - val_loss: 0.0026
Epoch 71/100
23/23 [==============================] - 8s 365ms/step - loss:
1.2679e-04 - val_loss: 6.7552e-04
Epoch 72/100
23/23 [==============================] - 8s 367ms/step - loss:
1.3514e-04 - val_loss: 0.0032
Epoch 73/100
23/23 [==============================] - 8s 368ms/step - loss:
1.3894e-04 - val_loss: 0.0011
Epoch 74/100
23/23 [==============================] - 8s 364ms/step - loss:
1.3531e-04 - val_loss: 0.0015
Epoch 75/100
23/23 [==============================] - 8s 369ms/step - loss:
1.1540e-04 - val_loss: 0.0013
Epoch 76/100
23/23 [==============================] - 9s 377ms/step - loss:
1.1980e-04 - val_loss: 0.0014
Epoch 77/100
23/23 [==============================] - 8s 366ms/step - loss:
1.1814e-04 - val_loss: 0.0015
Epoch 78/100
23/23 [==============================] - 8s 365ms/step - loss:
1.1714e-04 - val_loss: 0.0012
```

```
Epoch 79/100
23/23 [==============================] - 8s 370ms/step - loss:
1.1699e-04 - val_loss: 0.0019
Epoch 80/100
23/23 [==============================] - 9s 371ms/step - loss:
1.1428e-04 - val_loss: 7.5275e-04
Epoch 81/100
23/23 [==============================] - 8s 365ms/step - loss:
1.1993e-04 - val_loss: 0.0036
Epoch 82/100
23/23 [==============================] - 8s 365ms/step - loss:
1.4895e-04 - val_loss: 6.8925e-04
Epoch 83/100
23/23 [==============================] - 9s 373ms/step - loss:
1.3587e-04 - val_loss: 0.0014
Epoch 84/100
23/23 [==============================] - 8s 367ms/step - loss:
1.1363e-04 - val_loss: 0.0014
Epoch 85/100
23/23 [==============================] - 8s 363ms/step - loss:
1.2085e-04 - val_loss: 0.0010
Epoch 86/100
23/23 [==============================] - 8s 369ms/step - loss:
1.1642e-04 - val_loss: 6.1722e-04
Epoch 87/100
23/23 [==============================] - 10s 422ms/step - loss:
1.3603e-04 - val_loss: 0.0017
Epoch 88/100
23/23 [==============================] - 9s 374ms/step - loss:
1.1718e-04 - val_loss: 0.0016
Epoch 89/100
23/23 [==============================] - 9s 372ms/step - loss:
1.0971e-04 - val_loss: 0.0013
Epoch 90/100
23/23 [==============================] - 9s 370ms/step - loss:
1.0770e-04 - val_loss: 7.4313e-04
Epoch 91/100
23/23 [==============================] - 8s 368ms/step - loss:
1.2119e-04 - val_loss: 0.0021
Epoch 92/100
23/23 [==============================] - 9s 370ms/step - loss:
1.1101e-04 - val_loss: 0.0030
Epoch 93/100
23/23 [==============================] - 8s 370ms/step - loss:
1.3052e-04 - val_loss: 9.0901e-04
Epoch 94/100
23/23 [==============================] - 8s 367ms/step - loss:
1.1190e-04 - val_loss: 0.0016
Epoch 95/100
23/23 [==============================] - 9s 371ms/step - loss:
```

```
1.1133e-04 - val_loss: 0.0018
Epoch 96/100
23/23 [==============================] - 8s 370ms/step - loss:
1.1379e-04 - val_loss: 0.0021
Epoch 97/100
23/23 [==============================] - 9s 370ms/step - loss:
1.1103e-04 - val_loss: 9.2350e-04
Epoch 98/100
23/23 [==============================] - 9s 372ms/step - loss:
1.1314e-04 - val_loss: 0.0011
Epoch 99/100
23/23 [==============================] - 9s 371ms/step - loss:
1.0640e-04 - val_loss: 0.0017
Epoch 100/100
23/23 [==============================] - 9s 371ms/step - loss:
1.0860e-04 - val_loss: 0.0017

<tensorflow.python.keras.callbacks.History at 0x7f8489129310>

#Lets predict and check performance metrics
train_predict = model.predict(x_train)
test_predict = model.predict(x_test)

#Transform back to original form
train_predict = scaler.inverse_transform(train_predict)
test_predict = scaler.inverse_transform(test_predict)

#Calculate RMSE performance metrics
math.sqrt(mean_squared_error(y_train, train_predict))

135.39028152002348

#Test Data RMSE
math.sqrt(mean_squared_error(y_test, test_predict))

225.07505761849103

#Plotting

#Shift train prediction for plotting
look_back = 100
trainPredictPlot = np.empty_like(df_high)
trainPredictPlot[:,:] = np.nan
trainPredictPlot[look_back:len(train_predict) + look_back, :] =
train_predict

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

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



- Green indicates the Predicted Data
- Blue indicates the Complete Data
- Orange indicates the Train Data

Predict next 28 days Stock Price

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

```
(509, (408, 100, 1))
```

```
x_input = test_data[409:].reshape(1,-1)
x_input.shape
```

```
(1, 100)
```

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

```
lst_output=[]
n_steps=100
nextNumberOfDays = 28
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)
```

```
[0.59590065]
101
1 day input [0.86013417 0.85464525 0.84448059 0.8072779  0.71843871
0.66192316
 0.67696686 0.67554381 0.67310429 0.68428542 0.68936776 0.70217524
 0.71803212 0.72941655 0.73144948 0.74486684 0.76926205 0.75991055
 0.74242732 0.73958122 0.74771295 0.75991055 0.7584875  0.76621264
 0.75462492 0.76316324 0.79670665 0.80585485 0.7889815  0.78003659
 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492
 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706
 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038
 0.71193332 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423
 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992
 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723
 0.63854442 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507
 0.66761537 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819
 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995
 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694
 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023
 0.6391543  0.62614353 0.62268754 0.59590065]
1 day output [[0.5573215]]
2 day input [0.85464525 0.84448059 0.8072779  0.71843871 0.66192316
0.67696686
 0.67554381 0.67310429 0.68428542 0.68936776 0.70217524 0.71803212
```

```
 0.72941655 0.73144948 0.74486684 0.76926205 0.75991055 0.74242732
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 0.76316324 0.79670665 0.80585485 0.7889815  0.78003659 0.73978451
 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504
 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438
 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332
 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028
 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901
 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442
 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537
 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281
 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629
 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257
 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023 0.6391543
 0.62614353 0.62268754 0.59590065 0.55732149]
2 day output [[0.5139784]]
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0.67554381
 0.67310429 0.68428542 0.68936776 0.70217524 0.71803212 0.72941655
 0.73144948 0.74486684 0.76926205 0.75991055 0.74242732 0.73958122
 0.74771295 0.75991055 0.7584875  0.76621264 0.75462492 0.76316324
 0.79670665 0.80585485 0.7889815  0.78003659 0.73978451 0.73002643
 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019
 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438 0.78633869
 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332 0.68733482
 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028 0.67371417
 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586
 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927
 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878
 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646
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 0.62776987 0.6269567  0.63590161 0.62594023 0.6391543  0.62614353
 0.62268754 0.59590065 0.55732149 0.51397842]
3 day output [[0.47366163]]
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0.67310429
 0.68428542 0.68936776 0.70217524 0.71803212 0.72941655 0.73144948
 0.74486684 0.76926205 0.75991055 0.74242732 0.73958122 0.74771295
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 0.80585485 0.7889815  0.78003659 0.73978451 0.73002643 0.73490547
 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019 0.7737345
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 0.78328929 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662
 0.65257166 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861
 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843
 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047
 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878 0.64159382
 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783
 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336 0.61943484
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 0.59590065 0.55732149 0.51397842 0.47366163]
4 day output [[0.43589628]]
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 0.76926205 0.75991055 0.74242732 0.73958122 0.74771295 0.75991055
 0.7584875  0.76621264 0.75462492 0.76316324 0.79670665 0.80585485
 0.7889815  0.78003659 0.73978451 0.73002643 0.73490547 0.74872942
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 0.80585485 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929
 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166
 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447
 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394
 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555
 0.64728603 0.6574507  0.66761537 0.66720878 0.64159382 0.62776987
 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813
 0.63183574 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264
 0.57288067 0.62573694 0.63102257 0.6361049  0.62776987 0.6269567
 0.63590161 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065
 0.55732149 0.51397842 0.47366163 0.43589628]
5 day output [[0.4019182]]
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 0.75991055 0.74242732 0.73958122 0.74771295 0.75991055 0.7584875
 0.76621264 0.75462492 0.76316324 0.79670665 0.80585485 0.7889815
 0.78003659 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055
 0.75462492 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485
 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169
 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166 0.64301687
 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537
 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639
 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555  0.64728603
 0.6574507  0.66761537 0.66720878 0.64159382 0.62776987 0.63651149
 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574
 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067
 0.62573694 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161
 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149
 0.51397842 0.47366163 0.43589628 0.4019182 ]
6 day output [[0.37308648]]
7 day input [0.67696686 0.67554381 0.67310429 0.68428542 0.68936776
0.70217524
 0.71803212 0.72941655 0.73144948 0.74486684 0.76926205 0.75991055
 0.74242732 0.73958122 0.74771295 0.75991055 0.7584875  0.76621264
 0.75462492 0.76316324 0.79670665 0.80585485 0.7889815  0.78003659
 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492
 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706
 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038
```

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 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992
 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723
 0.63854442 0.63081927 0.62472047 0.6330555 0.64728603 0.6574507
 0.66761537 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819
 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995
 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694
 0.63102257 0.6361049 0.62776987 0.6269567 0.63590161 0.62594023
 0.6391543 0.62614353 0.62268754 0.59590065 0.55732149 0.51397842
 0.47366163 0.43589628 0.4019182 0.37308648]
7 day output [[0.34996918]]
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 0.73958122 0.74771295 0.75991055 0.7584875 0.76621264 0.75462492
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 0.76174019 0.7737345 0.82008538 0.80585485 0.81154706 0.77434438
 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332
 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028
 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901
 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442
 0.63081927 0.62472047 0.6330555 0.64728603 0.6574507 0.66761537
 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281
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 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257
 0.6361049 0.62776987 0.6269567 0.63590161 0.62594023 0.6391543
 0.62614353 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163
 0.43589628 0.4019182 0.37308648 0.34996918]
8 day output [[0.33248425]]
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 0.74771295 0.75991055 0.7584875 0.76621264 0.75462492 0.76316324
 0.79670665 0.80585485 0.7889815 0.78003659 0.73978451 0.73002643
 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019
 0.7737345 0.82008538 0.80585485 0.81154706 0.77434438 0.78633869
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 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586
 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927
 0.62472047 0.6330555 0.64728603 0.6574507 0.66761537 0.66720878
 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646
 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336
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 0.62776987 0.6269567 0.63590161 0.62594023 0.6391543 0.62614353
 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628
 0.4019182 0.37308648 0.34996918 0.33248425]
9 day output [[0.3201037]]
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 0.80585485 0.7889815 0.78003659 0.73978451 0.73002643 0.73490547
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 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843
 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047
 0.6330555 0.64728603 0.6574507 0.66761537 0.66720878 0.64159382
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 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628 0.4019182
 0.37308648 0.34996918 0.33248425 0.3201037]
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 0.7584875 0.76621264 0.75462492 0.76316324 0.79670665 0.80585485
 0.7889815 0.78003659 0.73978451 0.73002643 0.73490547 0.74872942
 0.75991055 0.75462492 0.75401504 0.76174019 0.7737345 0.82008538
 0.80585485 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929
 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166
 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447
 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394
 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555
 0.64728603 0.6574507 0.66761537 0.66720878 0.64159382 0.62776987
 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813
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 0.63590161 0.62594023 0.6391543 0.62614353 0.62268754 0.59590065
 0.55732149 0.51397842 0.47366163 0.43589628 0.4019182 0.37308648
 0.34996918 0.33248425 0.3201037 0.31201392]
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 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555 0.64728603
 0.6574507 0.66761537 0.66720878 0.64159382 0.62776987 0.63651149
 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574

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 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067
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 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149
 0.51397842 0.47366163 0.43589628 0.4019182  0.37308648 0.34996918
 0.33248425 0.3201037  0.31201392 0.30726281]
12 day output [[0.3048884]]
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 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492
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 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723
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 0.66761537 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819
 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995
 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694
 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023
 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149 0.51397842
 0.47366163 0.43589628 0.4019182  0.37308648 0.34996918 0.33248425
 0.3201037  0.31201392 0.30726281 0.3048884 ]
13 day output [[0.30401856]]
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0.74242732
 0.73958122 0.74771295 0.75991055 0.7584875  0.76621264 0.75462492
 0.76316324 0.79670665 0.80585485 0.7889815  0.78003659 0.73978451
 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504
 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438
 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332
 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028
 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901
 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442
 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537
 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281
 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629
 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257
 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023 0.6391543
 0.62614353 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163
 0.43589628 0.4019182  0.37308648 0.34996918 0.33248425 0.3201037
 0.31201392 0.30726281 0.3048884  0.30401856]
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 0.74771295 0.75991055 0.7584875  0.76621264 0.75462492 0.76316324
 0.79670665 0.80585485 0.7889815  0.78003659 0.73978451 0.73002643
 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019
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 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586
 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927
 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878
 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646
 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336
 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257 0.6361049
 0.62776987 0.6269567  0.63590161 0.62594023 0.6391543  0.62614353
 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628
 0.4019182  0.37308648 0.34996918 0.33248425 0.3201037  0.31201392
 0.30726281 0.3048884  0.30401856 0.30393994]
15 day output [[0.30413115]]
16 day input [0.74486684 0.76926205 0.75991055 0.74242732 0.73958122
0.74771295
 0.75991055 0.7584875  0.76621264 0.75462492 0.76316324 0.79670665
 0.80585485 0.7889815  0.78003659 0.73978451 0.73002643 0.73490547
 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019 0.7737345
 0.82008538 0.80585485 0.81154706 0.77434438 0.78633869 0.79284407
 0.78328929 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662
 0.65257166 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861
 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843
 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047
 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878 0.64159382
 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783
 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336 0.61943484
 0.57979264 0.57288067 0.62573694 0.63102257 0.6361049  0.62776987
 0.6269567  0.63590161 0.62594023 0.6391543  0.62614353 0.62268754
 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628 0.4019182
 0.37308648 0.34996918 0.33248425 0.3201037  0.31201392 0.30726281
 0.3048884  0.30401856 0.30393994 0.30413115]
16 day output [[0.30426404]]
17 day input [0.76926205 0.75991055 0.74242732 0.73958122 0.74771295
0.75991055
 0.7584875  0.76621264 0.75462492 0.76316324 0.79670665 0.80585485
 0.7889815  0.78003659 0.73978451 0.73002643 0.73490547 0.74872942
 0.75991055 0.75462492 0.75401504 0.76174019 0.7737345  0.82008538
 0.80585485 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929
 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166
 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447
 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394
 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555
 0.64728603 0.6574507  0.66761537 0.66720878 0.64159382 0.62776987
 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813
 0.63183574 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264
 0.57288067 0.62573694 0.63102257 0.6361049  0.62776987 0.6269567
 0.63590161 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065
 0.55732149 0.51397842 0.47366163 0.43589628 0.4019182  0.37308648
 0.34996918 0.33248425 0.3201037  0.31201392 0.30726281 0.3048884
 0.30401856 0.30393994 0.30413115 0.30426404]
```

```
17 day output [[0.3041788]]
18 day input [0.75991055 0.74242732 0.73958122 0.74771295 0.75991055
0.7584875
 0.76621264 0.75462492 0.76316324 0.79670665 0.80585485 0.7889815
 0.78003659 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055
 0.75462492 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485
 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169
 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166 0.64301687
 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537
 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639
 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555  0.64728603
 0.6574507  0.66761537 0.66720878 0.64159382 0.62776987 0.63651149
 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574
 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067
 0.62573694 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161
 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149
 0.51397842 0.47366163 0.43589628 0.4019182  0.37308648 0.34996918
 0.33248425 0.3201037  0.31201392 0.30726281 0.3048884  0.30401856
 0.30393994 0.30413115 0.30426404 0.3041788 ]
18 day output [[0.30384234]]
19 day input [0.74242732 0.73958122 0.74771295 0.75991055 0.7584875
0.76621264
 0.75462492 0.76316324 0.79670665 0.80585485 0.7889815  0.78003659
 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492
 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706
 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038
 0.71193332 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423
 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992
 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723
 0.63854442 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507
 0.66761537 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819
 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995
 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694
 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023
 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149 0.51397842
 0.47366163 0.43589628 0.4019182  0.37308648 0.34996918 0.33248425
 0.3201037  0.31201392 0.30726281 0.3048884  0.30401856 0.30393994
 0.30413115 0.30426404 0.3041788  0.30384234]
19 day output [[0.30330148]]
20 day input [0.73958122 0.74771295 0.75991055 0.7584875  0.76621264
0.75462492
 0.76316324 0.79670665 0.80585485 0.7889815  0.78003659 0.73978451
 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504
 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438
 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332
 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028
 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901
 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442
 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537
 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281
```

```
 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629
 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257
 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023 0.6391543
 0.62614353 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163
 0.43589628 0.4019182  0.37308648 0.34996918 0.33248425 0.3201037
 0.31201392 0.30726281 0.3048884  0.30401856 0.30393994 0.30413115
 0.30426404 0.3041788  0.30384234 0.30330148]
20 day output [[0.3026404]]
21 day input [0.74771295 0.75991055 0.7584875  0.76621264 0.75462492
0.76316324
 0.79670665 0.80585485 0.7889815  0.78003659 0.73978451 0.73002643
 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019
 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438 0.78633869
 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332 0.68733482
 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028 0.67371417
 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586
 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927
 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878
 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646
 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336
 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257 0.6361049
 0.62776987 0.6269567  0.63590161 0.62594023 0.6391543  0.62614353
 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628
 0.4019182  0.37308648 0.34996918 0.33248425 0.3201037  0.31201392
 0.30726281 0.3048884  0.30401856 0.30393994 0.30413115 0.30426404
 0.3041788  0.30384234 0.30330148 0.30264041]
21 day output [[0.30194628]]
22 day input [0.75991055 0.7584875  0.76621264 0.75462492 0.76316324
0.79670665
 0.80585485 0.7889815  0.78003659 0.73978451 0.73002643 0.73490547
 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019 0.7737345
 0.82008538 0.80585485 0.81154706 0.77434438 0.78633869 0.79284407
 0.78328929 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662
 0.65257166 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861
 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843
 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047
 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878 0.64159382
 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783
 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336 0.61943484
 0.57979264 0.57288067 0.62573694 0.63102257 0.6361049  0.62776987
 0.6269567  0.63590161 0.62594023 0.6391543  0.62614353 0.62268754
 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628 0.4019182
 0.37308648 0.34996918 0.33248425 0.3201037  0.31201392 0.30726281
 0.3048884  0.30401856 0.30393994 0.30413115 0.30426404 0.3041788
 0.30384234 0.30330148 0.30264041 0.30194628]
22 day output [[0.301288]]
23 day input [0.7584875  0.76621264 0.75462492 0.76316324 0.79670665
0.80585485
 0.7889815  0.78003659 0.73978451 0.73002643 0.73490547 0.74872942
 0.75991055 0.75462492 0.75401504 0.76174019 0.7737345  0.82008538
```

```
 0.80585485 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929
 0.77109169 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166
 0.64301687 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447
 0.66761537 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394
 0.64545639 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555
 0.64728603 0.6574507  0.66761537 0.66720878 0.64159382 0.62776987
 0.63651149 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813
 0.63183574 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264
 0.57288067 0.62573694 0.63102257 0.6361049  0.62776987 0.6269567
 0.63590161 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065
 0.55732149 0.51397842 0.47366163 0.43589628 0.4019182  0.37308648
 0.34996918 0.33248425 0.3201037  0.31201392 0.30726281 0.3048884
 0.30401856 0.30393994 0.30413115 0.30426404 0.3041788  0.30384234
 0.30330148 0.30264041 0.30194628 0.30128801]
23 day output [[0.30070508]]
24 day input [0.76621264 0.75462492 0.76316324 0.79670665 0.80585485
0.7889815
 0.78003659 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055
 0.75462492 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485
 0.81154706 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169
 0.74385038 0.71193332 0.68733482 0.67818662 0.65257166 0.64301687
 0.65643423 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537
 0.67838992 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639
 0.64118723 0.63854442 0.63081927 0.62472047 0.6330555  0.64728603
 0.6574507  0.66761537 0.66720878 0.64159382 0.62776987 0.63651149
 0.63630819 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574
 0.57653995 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067
 0.62573694 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161
 0.62594023 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149
 0.51397842 0.47366163 0.43589628 0.4019182  0.37308648 0.34996918
 0.33248425 0.3201037  0.31201392 0.30726281 0.3048884  0.30401856
 0.30393994 0.30413115 0.30426404 0.3041788  0.30384234 0.30330148
 0.30264041 0.30194628 0.30128801 0.30070508]
24 day output [[0.3002062]]
25 day input [0.75462492 0.76316324 0.79670665 0.80585485 0.7889815
0.78003659
 0.73978451 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492
 0.75401504 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706
 0.77434438 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038
 0.71193332 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423
 0.67656028 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992
 0.69993901 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723
 0.63854442 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507
 0.66761537 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819
 0.62980281 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995
 0.57816629 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694
 0.63102257 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023
 0.6391543  0.62614353 0.62268754 0.59590065 0.55732149 0.51397842
 0.47366163 0.43589628 0.4019182  0.37308648 0.34996918 0.33248425
 0.3201037  0.31201392 0.30726281 0.3048884  0.30401856 0.30393994
```

```
 0.30413115 0.30426404 0.3041788  0.30384234 0.30330148 0.30264041
 0.30194628 0.30128801 0.30070508 0.30020621]
25 day output [[0.29977357]]
26 day input [0.76316324 0.79670665 0.80585485 0.7889815  0.78003659
0.73978451
 0.73002643 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504
 0.76174019 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438
 0.78633869 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332
 0.68733482 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028
 0.67371417 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901
 0.63122586 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442
 0.63081927 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537
 0.66720878 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281
 0.62817646 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629
 0.57613336 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257
 0.6361049  0.62776987 0.6269567  0.63590161 0.62594023 0.6391543
 0.62614353 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163
 0.43589628 0.4019182  0.37308648 0.34996918 0.33248425 0.3201037
 0.31201392 0.30726281 0.3048884  0.30401856 0.30393994 0.30413115
 0.30426404 0.3041788  0.30384234 0.30330148 0.30264041 0.30194628
 0.30128801 0.30070508 0.30020621 0.29977357]
26 day output [[0.29937094]]
27 day input [0.79670665 0.80585485 0.7889815  0.78003659 0.73978451
0.73002643
 0.73490547 0.74872942 0.75991055 0.75462492 0.75401504 0.76174019
 0.7737345  0.82008538 0.80585485 0.81154706 0.77434438 0.78633869
 0.79284407 0.78328929 0.77109169 0.74385038 0.71193332 0.68733482
 0.67818662 0.65257166 0.64301687 0.65643423 0.67656028 0.67371417
 0.65114861 0.65521447 0.66761537 0.67838992 0.69993901 0.63122586
 0.63508843 0.64098394 0.64545639 0.64118723 0.63854442 0.63081927
 0.62472047 0.6330555  0.64728603 0.6574507  0.66761537 0.66720878
 0.64159382 0.62776987 0.63651149 0.63630819 0.62980281 0.62817646
 0.63813783 0.65358813 0.63183574 0.57653995 0.57816629 0.57613336
 0.61943484 0.57979264 0.57288067 0.62573694 0.63102257 0.6361049
 0.62776987 0.6269567  0.63590161 0.62594023 0.6391543  0.62614353
 0.62268754 0.59590065 0.55732149 0.51397842 0.47366163 0.43589628
 0.4019182  0.37308648 0.34996918 0.33248425 0.3201037  0.31201392
 0.30726281 0.3048884  0.30401856 0.30393994 0.30413115 0.30426404
 0.3041788  0.30384234 0.30330148 0.30264041 0.30194628 0.30128801
 0.30070508 0.30020621 0.29977357 0.29937094]
27 day output [[0.29895273]]
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[0.3041311502456665], [0.30426403880119324], [0.30417880415916443],
[0.30384233593940735], [0.30330148339271545], [0.3026404082775116],
[0.3019462823867798], [0.30128800868988037], [0.30070507526397705],
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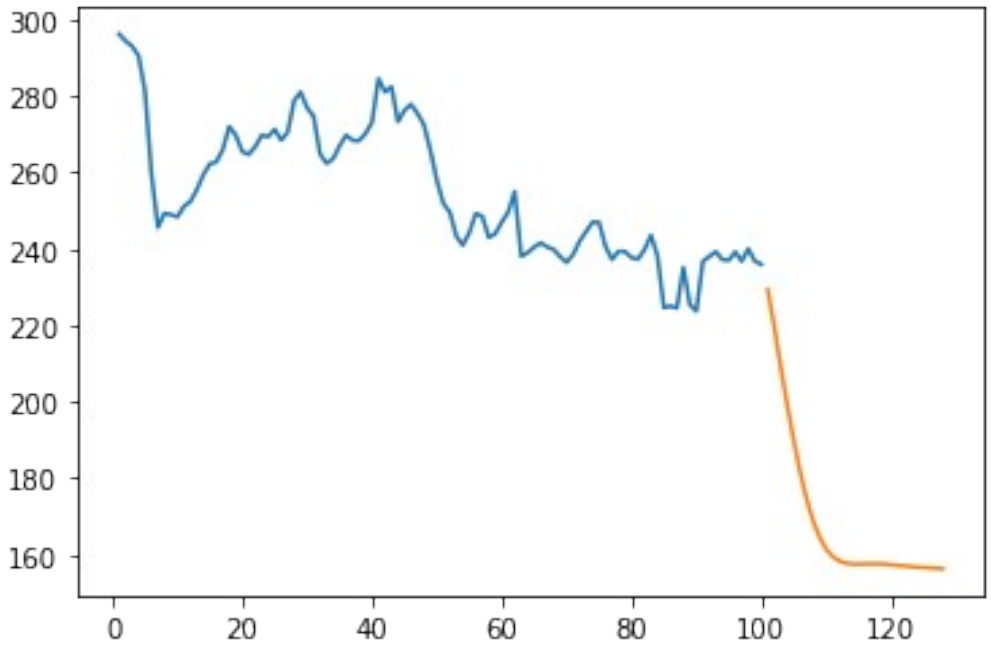
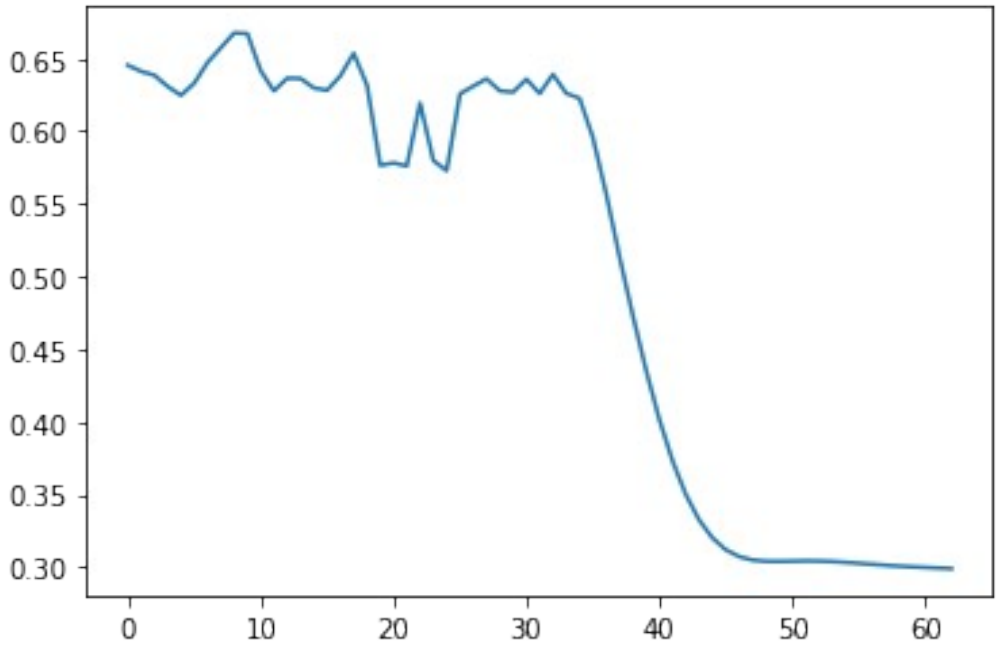
```
[0.3002062141895294], [0.29977357387542725], [0.2993709444999695],
[0.29895272850990295]]

day_new = np.arange(1,101)
day_pred = np.arange(101,129)

day_new.shape

(100,)

day_pred.shape

(28,)

df3 = df_high.tolist()
df3.extend(lst_output)

len(df_high)

2035

plt.plot(day_new, scaler.inverse_transform(df_high[1935:]))
plt.plot(day_pred, scaler.inverse_transform(lst_output))

[<matplotlib.lines.Line2D at 0x7f84890af210>]
```



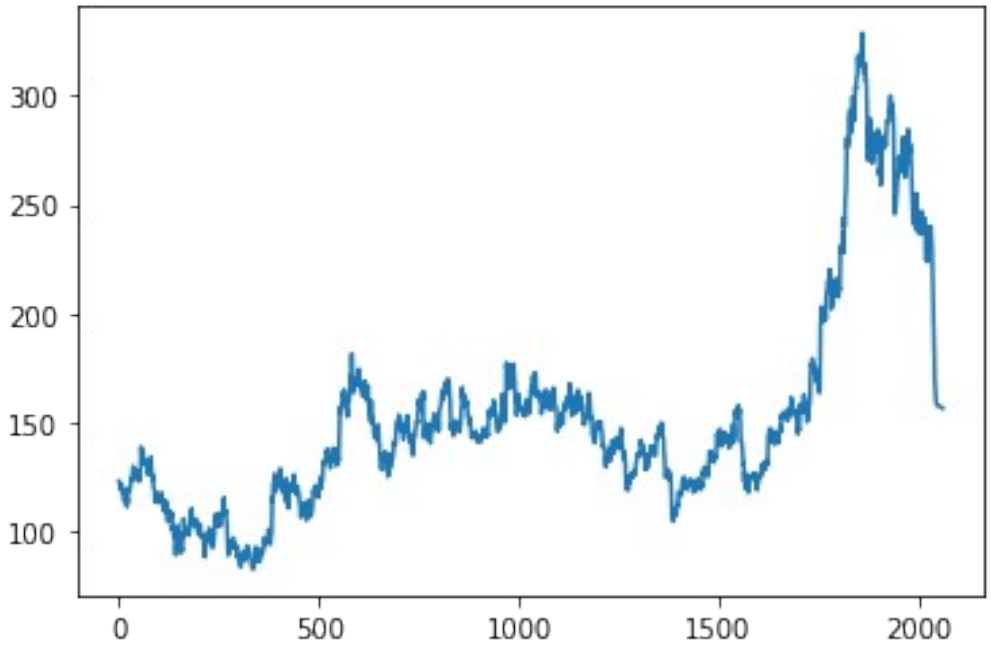

```
df3=df_high.tolist()
df3.extend(lst_output)
plt.plot(df3[2000:])

[<matplotlib.lines.Line2D at 0x7f8488d49250>]
```




```
df3=scaler.inverse_transform(df3).tolist()
```

```
plt.plot(df3)
```

```
[<matplotlib.lines.Line2D at 0x7f84867ac490>]
```



THANK YOU