```
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#DL_Lab_04

import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Dropout
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
from google.colab import files
uploaded = files.upload()
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving Google_Stock_Price_Test.csv to Google_Stock_Price_Test.csv
Saving Google_Stock_Price_Train.csv to Google_Stock_Price_Train.csv
```

```
dataset_train = pd.read_csv('Google_Stock_Price_Train.csv')
dataset_train.head()
```

	Date	Open	High	Low	Close	Volume
0	01/03/2012	325.25	332.83	324.97	663.59	7,380,500
1	01/04/2012	331.27	333.87	329.08	666.45	5,749,400
2	01/05/2012	329.83	330.75	326.89	657.21	6,590,300
3	01/06/2012	328.34	328.77	323.68	648.24	5,405,900
4	01/09/2012	322.04	322.29	309.46	620.76	11,688,800

```
#keras only takes numpy array
training_set = dataset_train.iloc[:, 1: 2].values
training_set.shape
```

```
(1509, 1)
```

```
sc = MinMaxScaler(feature_range = (0, 1))
#fit: get min/max of train data
training_set_scaled = sc.fit_transform(training_set)
```

```
#60 timesteps and 1 output
X_train = []
y_train = []
for i in range(60, len(training_set_scaled)):
    X_train.append(training_set_scaled[i-60: i, 0])
    y_train.append(training_set_scaled[i, 0])

X_train, y_train = np.array(X_train), np.array(y_train)
```

```
X_train.shape
```

```
(1449, 60)
```

```
y_train.shape
```

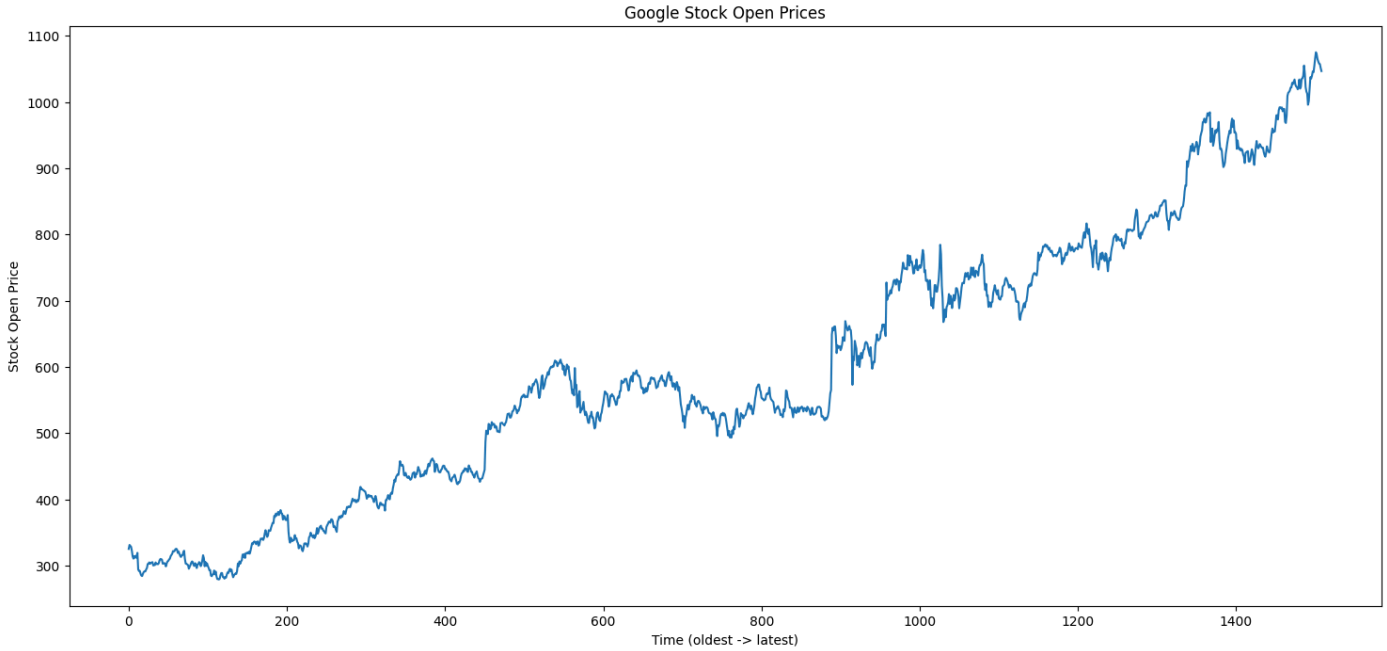
```
(1449,)
```

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

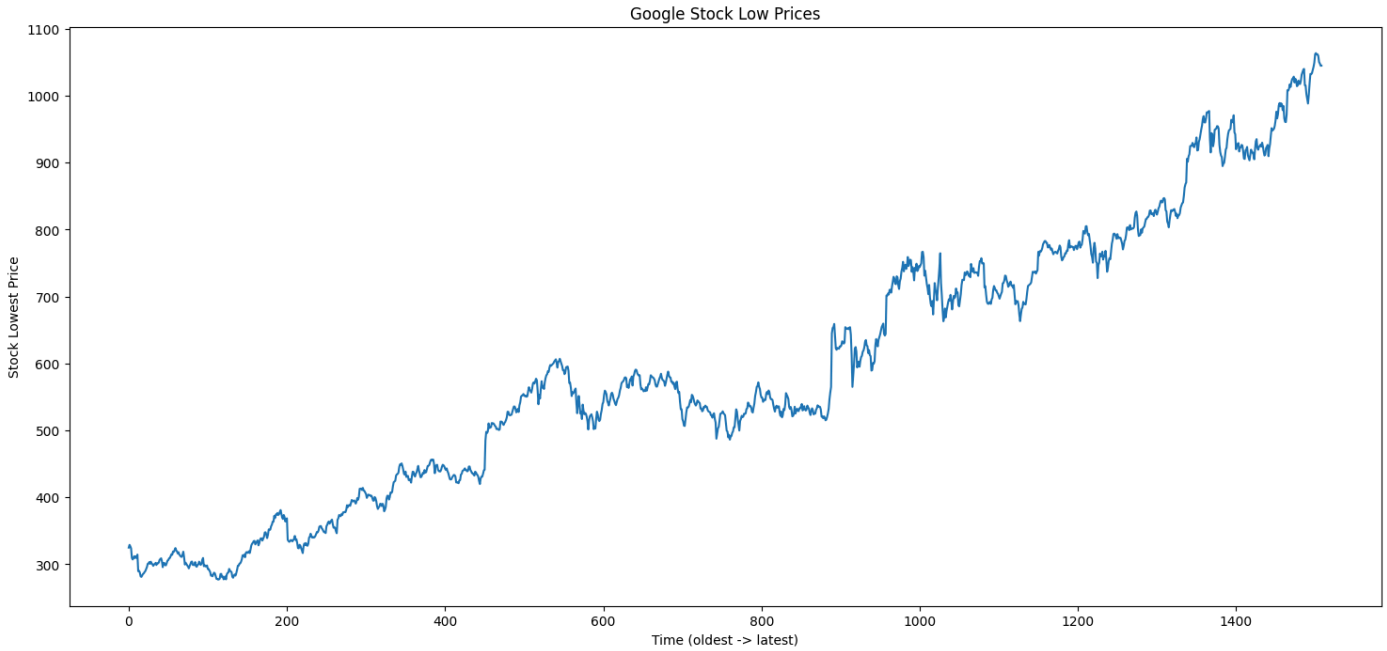
```
X_train.shape
```

```
(1449, 60, 1)
```

```
plt.figure(figsize=(18, 8))
plt.plot(dataset_train['Open'])
plt.title("Google Stock Open Prices")
plt.xlabel("Time (oldest -> latest)")
plt.ylabel("Stock Open Price")
plt.show()
```




```
plt.figure(figsize=(18, 8))
plt.plot(dataset_train['Low'])
plt.title("Google Stock Low Prices")
plt.xlabel("Time (oldest -> latest)")
plt.ylabel("Stock Lowest Price")
plt.show()
```




```
regressor = Sequential()
#add 1st lstm layer
regressor.add(LSTM(units = 50, return_sequences = True, input_shape = (X_train.shape[1], 1)))
regressor.add(Dropout(rate = 0.2))

##add 2nd lstm layer: 50 neurons
regressor.add(LSTM(units = 50, return_sequences = True))
regressor.add(Dropout(rate = 0.2))

##add 3rd lstm layer
regressor.add(LSTM(units = 50, return_sequences = True))
regressor.add(Dropout(rate = 0.2))

##add 4th lstm layer
regressor.add(LSTM(units = 50, return_sequences = False))
regressor.add(Dropout(rate = 0.2))

##add output layer
regressor.add(Dense(units = 1))
```

```
regressor.compile(optimizer = 'adam', loss = 'mean_squared_error')
```

```
regressor.fit(x = X_train, y = y_train, batch_size = 32, epochs = 100)
```

```
Epoch 1/100
46/46 [==============================] - 13s 97ms/step - loss: 0.0252
Epoch 2/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0048
Epoch 3/100
46/46 [==============================] - 6s 124ms/step - loss: 0.0033
Epoch 4/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0035
Epoch 5/100
46/46 [==============================] - 4s 92ms/step - loss: 0.0030
Epoch 6/100
46/46 [==============================] - 6s 125ms/step - loss: 0.0028
Epoch 7/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0028
Epoch 8/100
46/46 [==============================] - 5s 101ms/step - loss: 0.0028
```

```
Epoch 9/100
46/46 [==============================] - 6s 126ms/step - loss: 0.0029
Epoch 10/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0026
Epoch 11/100
46/46 [==============================] - 5s 99ms/step - loss: 0.0031
Epoch 12/100
46/46 [==============================] - 6s 137ms/step - loss: 0.0025
Epoch 13/100
46/46 [==============================] - 4s 94ms/step - loss: 0.0026
Epoch 14/100
46/46 [==============================] - 6s 121ms/step - loss: 0.0027
Epoch 15/100
46/46 [==============================] - 5s 97ms/step - loss: 0.0022
Epoch 16/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0026
Epoch 17/100
46/46 [==============================] - 6s 126ms/step - loss: 0.0026
Epoch 18/100
46/46 [==============================] - 4s 94ms/step - loss: 0.0023
Epoch 19/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0023
Epoch 20/100
46/46 [==============================] - 6s 126ms/step - loss: 0.0020
Epoch 21/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0021
Epoch 22/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0021
Epoch 23/100
46/46 [==============================] - 6s 125ms/step - loss: 0.0019
Epoch 24/100
46/46 [==============================] - 4s 93ms/step - loss: 0.0021
Epoch 25/100
46/46 [==============================] - 5s 118ms/step - loss: 0.0020
Epoch 26/100
46/46 [==============================] - 5s 114ms/step - loss: 0.0018
Epoch 27/100
46/46 [==============================] - 4s 94ms/step - loss: 0.0020
Epoch 28/100
46/46 [==============================] - 5s 111ms/step - loss: 0.0019
Epoch 29/100
46/46 [==============================] - 5s 107ms/step - loss: 0.0018
```

```
dataset_test = pd.read_csv('Google_Stock_Price_Test.csv')
dataset_test.head()
```

	Date	Open	High	Low	Close	Volume
0	02/01/2018	1048.339966	1066.939941	1045.229980	1065.000000	1237600
1	03/01/2018	1064.310059	1086.290039	1063.209961	1082.479980	1430200
2	04/01/2018	1088.000000	1093.569946	1084.001953	1086.400024	1004600
3	05/01/2018	1094.000000	1104.250000	1092.000000	1102.229980	1279100
4	08/01/2018	1102.229980	1111.270020	1101.619995	1106.939941	1047600

```
#keras only takes numpy array
real_stock_price = dataset_test.iloc[:, 1: 2].values
real_stock_price.shape
```

```
(125, 1)
```

```
#vertical concat use 0, horizontal uses 1
dataset_total = pd.concat((dataset_train['Open'], dataset_test['Open']),
                          axis = 0)
#use .values to make numpy array
inputs = dataset_total[len(dataset_total) - len(dataset_test) - 60:].values
```

```
#reshape data to only have 1 col
inputs = inputs.reshape(-1, 1)

#scale input
inputs = sc.transform(inputs)
len(inputs)
```

```
185
```

```
X_test = []
for i in range(60, len(inputs)):
    X_test.append(inputs[i-60:i, 0])
X_test = np.array(X_test)
#add dimension of indicator
X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))
```

```
X_test.shape
```

```
(125, 60, 1)
```

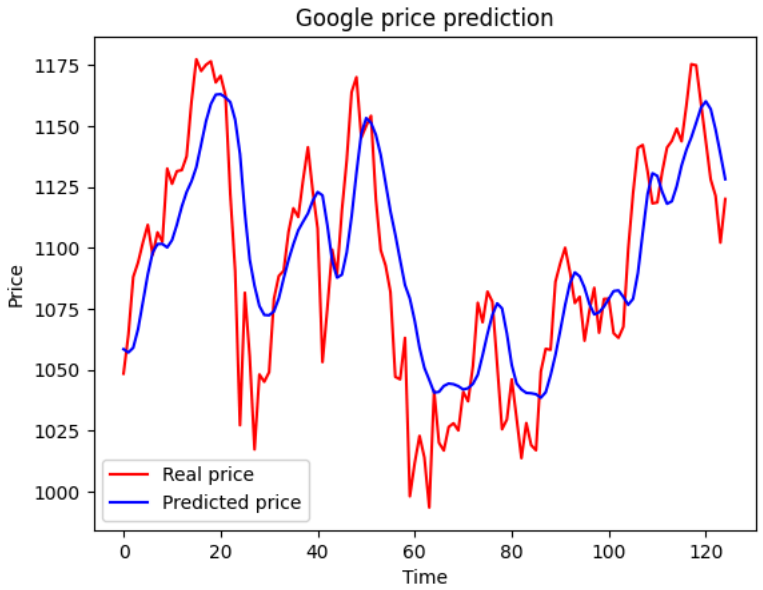
```
predicted_stock_price = regressor.predict(X_test)
```

```
4/4 [==============================] - 2s 40ms/step
```

```
#inverse the scaled value
predicted_stock_price = sc.inverse_transform(predicted_stock_price)
```

```
#visualize the prediction and real price
plt.plot(real_stock_price, color = 'red', label = 'Real price')
plt.plot(predicted_stock_price, color = 'blue', label = 'Predicted price')

plt.title('Google price prediction')
plt.xlabel('Time')
plt.ylabel('Price')
plt.legend()
plt.show()
```




```
Start coding or generate with AI.
```