```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import statsmodels.api as sm

dataset = pd.read_excel("Sales_Forecasting.xlsx")

dataset.head()
```

```
     HQ Country  State_of_outlet   City_of_outlet  Month  Day  Year  \
0  Asia   India              NaN  Bombay (Mumbai)      1    1  2005
1  Asia   India              NaN  Bombay (Mumbai)      1    2  2005
2  Asia   India              NaN  Bombay (Mumbai)      1    3  2005
3  Asia   India              NaN  Bombay (Mumbai)      1    4  2005
4  Asia   India              NaN  Bombay (Mumbai)      1    5  2005

   Total_Sales
0         72.2
1         72.7
2         74.3
3         78.9
4         81.5
```

```
dataset.tail()
```

```
         HQ Country  State_of_outlet City_of_outlet  Month  Day  Year
\
17531  Asia   India              NaN          Delhi     12   27  2016

17532  Asia   India              NaN          Delhi     12   28  2016

17533  Asia   India              NaN          Delhi     12   29  2016

17534  Asia   India              NaN          Delhi     12   30  2016

17535  Asia   India              NaN          Delhi     12   31  2016


       Total_Sales
17531         61.3
17532         61.7
17533         59.3
17534         57.1
17535         58.3
```

```
dataset.describe()
```

```
       State_of_outlet         Month           Day          Year
Total_Sales
count              0.0  17536.000000  17536.000000  17536.000000
17536.000000
```

```
mean                NaN      6.524179     15.732892   2010.502053
80.117963
std                 NaN      3.449400      8.801978      3.452525
13.315486
min                 NaN      1.000000      1.000000   2005.000000    -
99.000000
25%                 NaN      4.000000      8.000000   2008.000000
77.500000
50%                 NaN      7.000000     16.000000   2011.000000
82.600000
75%                 NaN     10.000000     23.000000   2014.000000
86.100000
max                 NaN     12.000000     31.000000   2016.000000
102.500000
```

```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 17536 entries, 0 to 17535
Data columns (total 8 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   HQ               17536 non-null  object
 1   Country          17536 non-null  object
 2   State_of_outlet  0 non-null      float64
 3   City_of_outlet   17536 non-null  object
 4   Month            17536 non-null  int64
 5   Day              17536 non-null  int64
 6   Year             17536 non-null  int64
 7   Total_Sales      17536 non-null  float64
dtypes: float64(2), int64(3), object(3)
memory usage: 1.1+ MB
```

```
from datetime import datetime
dataset['Date'] = dataset.apply(lambda  row:
datetime.strptime(f"{int(row.Year)}-{int(row.Month)}-{int(row.Day)}",
'%Y-%m-%d'), axis=1)
```

```
dataset['Date'].min(), dataset['Date'].max()
```

```
(Timestamp('2005-01-01 00:00:00'), Timestamp('2016-12-31 00:00:00'))
```

```
cols =
['Month','Day','Year','City_of_outlet','State_of_outlet','Country','HQ
']
dataset.drop(cols, axis=1, inplace=True)
dataset = dataset.sort_values('Date')
```

```
cols =
['Month','Day','Year','City_of_outlet','State_of_outlet','Country','HQ
']
```

```
dataset.drop(cols, axis=1, inplace=True)
dataset = dataset.sort_values('Date')

---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call
last)
<ipython-input-125-13c25752efd5> in <module>
      1 cols =
['Month','Day','Year','City_of_outlet','State_of_outlet','Country','HQ
']
----> 2 dataset.drop(cols, axis=1, inplace=True)
      3 dataset = dataset.sort_values('Date')

C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\frame.py in
drop(self, labels, axis, index, columns, level, inplace, errors)
   4306                 weight  1.0     0.8
   4307         """
-> 4308         return super().drop(
   4309             labels=labels,
   4310             axis=axis,

C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\generic.py in
drop(self, labels, axis, index, columns, level, inplace, errors)
   4151         for axis, labels in axes.items():
   4152             if labels is not None:
-> 4153                 obj = obj._drop_axis(labels, axis,
level=level, errors=errors)
   4154
   4155         if inplace:

C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\generic.py in
_drop_axis(self, labels, axis, level, errors)
   4186                 new_axis = axis.drop(labels, level=level,
errors=errors)
   4187             else:
-> 4188                 new_axis = axis.drop(labels, errors=errors)
   4189             result = self.reindex(**{axis_name: new_axis})
   4190

C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\indexes\base.py
in drop(self, labels, errors)
   5589         if mask.any():
   5590             if errors != "ignore":
-> 5591                 raise KeyError(f"{labels[mask]} not found in
axis")
   5592             indexer = indexer[~mask]
   5593         return self.delete(indexer)
```

```
KeyError: "['Month' 'Day' 'Year' 'City_of_outlet' 'State_of_outlet'
'Country' 'HQ'] not found in axis"
```

```
Sales_y.index
```

```
---------------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
<ipython-input-126-95afe5c4e0e5> in <module>
----> 1 Sales_y.index

AttributeError: 'numpy.ndarray' object has no attribute 'index'
```

```
dataset.isnull()
```

```
       Total_Sales   Date
0            False  False
730          False  False
1095         False  False
365          False  False
1            False  False
...            ...    ...
16802        False  False
17169        False  False
16437        False  False
16803        False  False
17535        False  False

[17536 rows x 2 columns]
```

```
dataset.groupby('Date')['Total_Sales'].sum().reset_index()
```

```
           Date  Total_Sales
0    2005-01-01        275.5
1    2005-01-02        275.5
2    2005-01-03        278.6
3    2005-01-04        279.3
4    2005-01-05        281.4
...         ...          ...
4378 2016-12-27        288.4
4379 2016-12-28        283.3
4380 2016-12-29        281.7
4381 2016-12-30        282.0
4382 2016-12-31        281.9

[4383 rows x 2 columns]
```

```
Sales_y= dataset.set_index('Date')
```

```
Sales_y.index
```

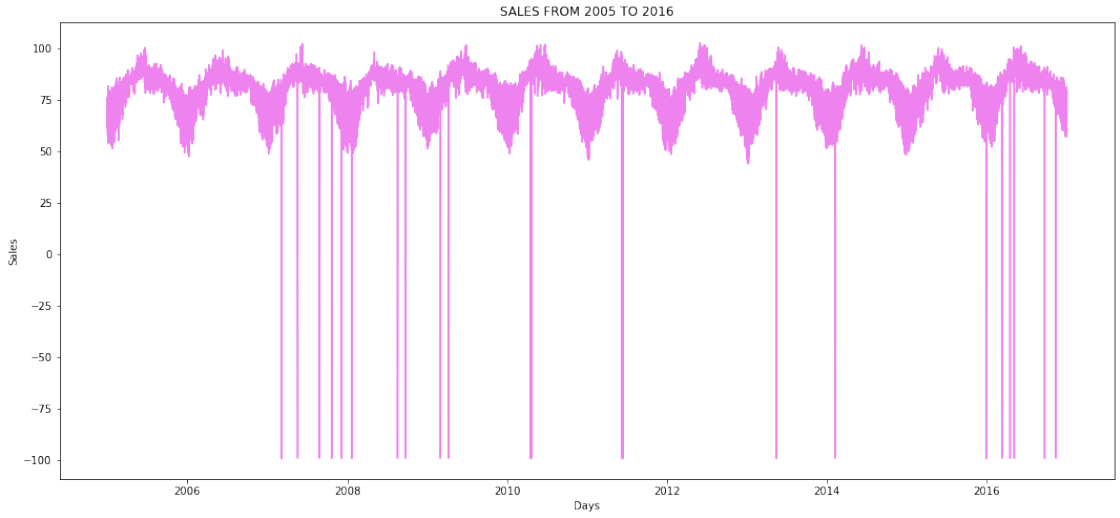
```
DatetimeIndex(['2005-01-01', '2005-01-01', '2005-01-01', '2005-01-01',
               '2005-01-02', '2005-01-02', '2005-01-02', '2005-01-02',
               '2005-01-03', '2005-01-03',
               ...
               '2016-12-29', '2016-12-29', '2016-12-30', '2016-12-30',
               '2016-12-30', '2016-12-30', '2016-12-31', '2016-12-31',
               '2016-12-31', '2016-12-31'],
              dtype='datetime64[ns]', name='Date', length=17536,
freq=None)
```

```
Sales=Sales_y.copy()
```

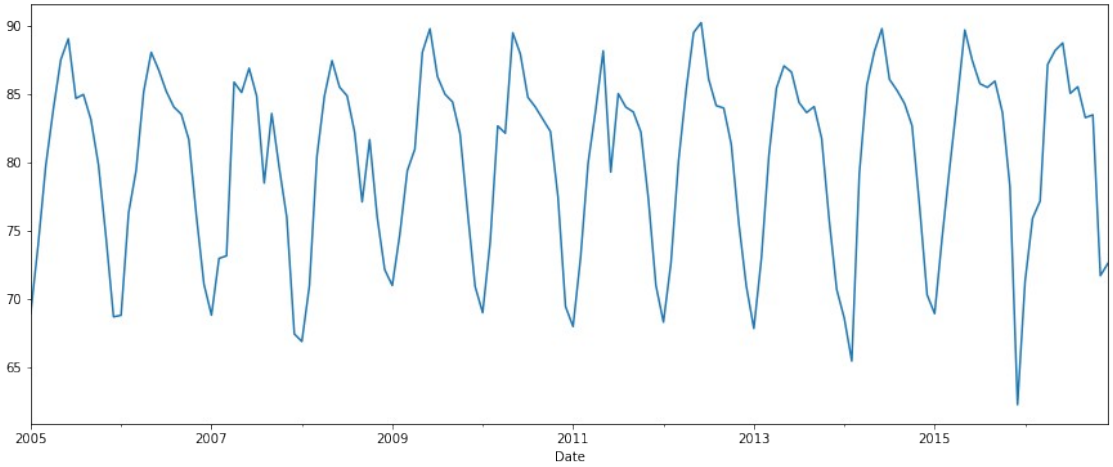
```
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler(feature_range=(0,1))
dataset_oil=scaler.fit_transform(np.array(dataset_oil).reshape(-1,1))
```

```
---------------------------------------------------------------------------
-----
NameError                                 Traceback (most recent call
last)
<ipython-input-132-8f7c48c4f97e> in <module>
      1 from sklearn.preprocessing import MinMaxScaler
      2 scaler=MinMaxScaler(feature_range=(0,1))
----> 3
dataset_oil=scaler.fit_transform(np.array(dataset_oil).reshape(-1,1))

NameError: name 'dataset_oil' is not defined
```

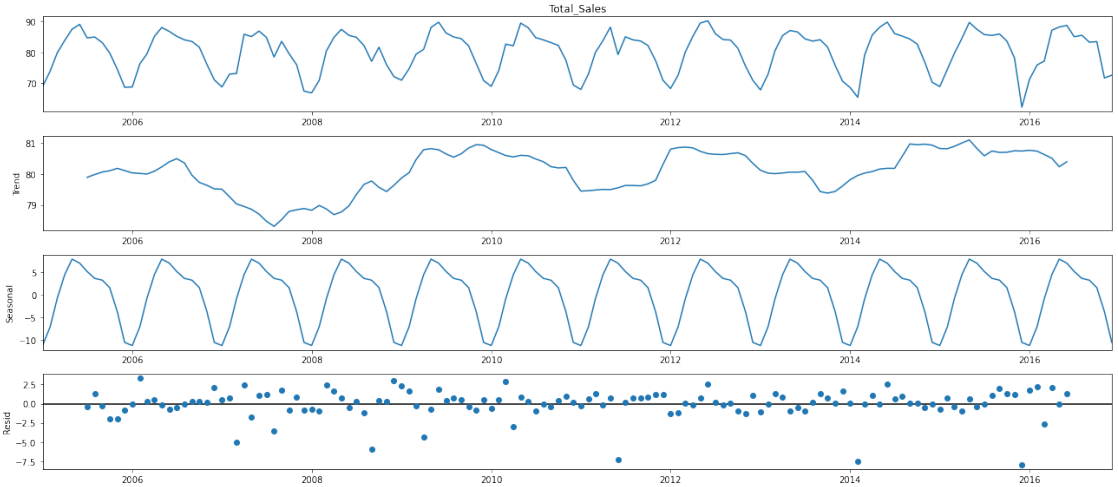
```
plt.plot(Sales_y, color = 'violet')
plt.title('SALES FROM 2005 TO 2016')
plt.xlabel('Days')
plt.ylabel('Sales')
plt.show()
```



```
monthly_sales = Sales_y['Total_Sales'].resample('MS').mean()

monthly_sales.plot(figsize=(15,6))
plt.show()
```




```
from pylab import rcParams
rcParams['figure.figsize'] = 18,8

decomposition = sm.tsa.seasonal_decompose(monthly_sales ,
model='additive')
fig = decomposition.plot()
plt.show()
```




```
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler(feature_range=(0,1))
Sales_y=scaler.fit_transform(np.array(Sales_y).reshape(-1,1))

import pickle
pickle.dump(scaler,open("Scaler_forecast.pkl","wb"))
```

```
training_size=int(len(Sales_y)*0.63)
test_size=len(Sales_y)-training_size
train_dataset,test_dataset=Sales_y[0:training_size,:],Sales_y[training
_size:len(Sales_y),:1]

training_size,test_size

(11047, 6489)

train_dataset.shape

(11047, 1)

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 = 10
X_train, y_train = create_dataset(train_dataset, time_step)
X_test, ytest = create_dataset(test_dataset, time_step)

print(X_train.shape), print(y_train.shape)

(11036, 10)
(11036,)

(None, None)

print(X_test.shape), print(ytest.shape)

(6478, 10)
(6478,)

(None, None)

X_train

array([[0.84962779, 0.8674938 , 0.79404467, ..., 0.77617866,
0.85260546,
        0.8764268 ],
       [0.8674938 , 0.79404467, 0.82133995, ..., 0.85260546, 0.8764268
,
        0.86004963],
       [0.79404467, 0.82133995, 0.85210918, ..., 0.8764268 ,
0.86004963,
        0.75880893],
       ...,
       [0.91116625, 0.93647643, 0.90471464, ..., 0.94342432, 0.9235732
,
```

```
        0.9325062 ],
       [0.93647643, 0.90471464, 0.91662531, ..., 0.9235732 , 0.9325062
,
        0.90769231],
       [0.90471464, 0.91662531, 0.90818859, ..., 0.9325062 ,
0.90769231,
        0.93101737]])

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)

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM

import tensorflow

pip install tensorflow

pip install tensorflow

pip install tensorflow-gpu

pip install keras

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM

model=Sequential

model.add(LSTM(50,return_sequences=True,input_shape=(10,1)))
model.add(LSTM(50,return_sequences=True))
model.add(LSTM(50))

---------------------------------------------------------------------
-----
TypeError                                 Traceback (most recent call
last)
<ipython-input-39-7de496d792c2> in <module>
----> 1 model.add(LSTM(50,return_sequences=True,input_shape=(10,1)))
      2 model.add(LSTM(50,return_sequences=True))
      3 model.add(LSTM(50))

~\AppData\Roaming\Python\Python38\site-packages\tensorflow\python\
training\tracking\base.py in _method_wrapper(self, *args, **kwargs)
    520     self._self_setattr_tracking = False  # pylint:
disable=protected-access
    521     try:
--> 522       result = method(self, *args, **kwargs)
    523     finally:
    524       self._self_setattr_tracking = previous_value  # pylint:
```

```
disable=protected-access

TypeError: add() missing 1 required positional argument: 'layer'

pip install tensorflow

Collecting tensorflowNote: you may need to restart the kernel to use
updated packages.

  Using cached tensorflow-2.5.0-cp38-cp38-win_amd64.whl (422.6 MB)
Collecting gast==0.4.0
  Using cached gast-0.4.0-py3-none-any.whl (9.8 kB)
Collecting h5py~=3.1.0
  Using cached h5py-3.1.0-cp38-cp38-win_amd64.whl (2.7 MB)
Requirement already satisfied: wheel~=0.35 in c:\programdata\
anaconda3\lib\site-packages (from tensorflow) (0.36.2)
Requirement already satisfied: opt-einsum~=3.3.0 in c:\programdata\
anaconda3\lib\site-packages (from tensorflow) (3.3.0)
Requirement already satisfied: grpcio~=1.34.0 in c:\users\eeksh\
appdata\roaming\python\python38\site-packages (from tensorflow)
(1.34.1)
Requirement already satisfied: termcolor~=1.1.0 in c:\users\eeksh\
appdata\roaming\python\python38\site-packages (from tensorflow)
(1.1.0)
Requirement already satisfied: absl-py~=0.10 in c:\users\eeksh\
appdata\roaming\python\python38\site-packages (from tensorflow)
(0.13.0)
Requirement already satisfied: keras-nightly~=2.5.0.dev in c:\
programdata\anaconda3\lib\site-packages (from tensorflow)
(2.5.0.dev2021032900)
Requirement already satisfied: tensorflow-estimator<2.6.0,>=2.5.0rc0
in c:\users\eeksh\appdata\roaming\python\python38\site-packages (from
tensorflow) (2.5.0)
Requirement already satisfied: wrapt~=1.12.1 in c:\programdata\
anaconda3\lib\site-packages (from tensorflow) (1.12.1)
Requirement already satisfied: numpy~=1.19.2 in c:\users\eeksh\
appdata\roaming\python\python38\site-packages (from tensorflow)
(1.19.5)
Collecting flatbuffers~=1.12.0
  Using cached flatbuffers-1.12-py2.py3-none-any.whl (15 kB)
Collecting google-pasta~=0.2

ERROR: Could not install packages due to an OSError: [WinError 5]
Access is denied: 'c:\\programdata\\anaconda3\\lib\\site-packages\\
h5py-2.10.0.dist-info\\AUTHORS'
Consider using the `--user` option or check the permissions.



  Using cached google_pasta-0.2.0-py3-none-any.whl (57 kB)
Requirement already satisfied: keras-preprocessing~=1.1.2 in c:\
```

```
programdata\anaconda3\lib\site-packages (from tensorflow) (1.1.2)
Requirement already satisfied: typing-extensions~=3.7.4 in c:\
programdata\anaconda3\lib\site-packages (from tensorflow) (3.7.4.3)
Requirement already satisfied: protobuf>=3.9.2 in c:\programdata\
anaconda3\lib\site-packages (from tensorflow) (3.17.3)
Requirement already satisfied: six~=1.15.0 in c:\programdata\
anaconda3\lib\site-packages (from tensorflow) (1.15.0)
Collecting astunparse~=1.6.3
  Using cached astunparse-1.6.3-py2.py3-none-any.whl (12 kB)
Requirement already satisfied: tensorboard~=2.5 in c:\users\eeksh\
appdata\roaming\python\python38\site-packages (from tensorflow)
(2.5.0)
Requirement already satisfied: requests<3,>=2.21.0 in c:\programdata\
anaconda3\lib\site-packages (from tensorboard~=2.5->tensorflow)
(2.25.1)
Requirement already satisfied: setuptools>=41.0.0 in c:\programdata\
anaconda3\lib\site-packages (from tensorboard~=2.5->tensorflow)
(52.0.0.post20210125)
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in c:\
users\eeksh\appdata\roaming\python\python38\site-packages (from
tensorboard~=2.5->tensorflow) (0.4.4)
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in c:\
programdata\anaconda3\lib\site-packages (from tensorboard~=2.5-
>tensorflow) (1.8.0)
Requirement already satisfied: google-auth<2,>=1.6.3 in c:\
programdata\anaconda3\lib\site-packages (from tensorboard~=2.5-
>tensorflow) (1.32.0)
Requirement already satisfied: werkzeug>=0.11.15 in c:\programdata\
anaconda3\lib\site-packages (from tensorboard~=2.5->tensorflow)
(1.0.1)
Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0
in c:\programdata\anaconda3\lib\site-packages (from tensorboard~=2.5-
>tensorflow) (0.6.1)
Requirement already satisfied: markdown>=2.6.8 in c:\users\eeksh\
appdata\roaming\python\python38\site-packages (from tensorboard~=2.5-
>tensorflow) (3.3.4)
Requirement already satisfied: pyasn1-modules>=0.2.1 in c:\
programdata\anaconda3\lib\site-packages (from google-auth<2,>=1.6.3-
>tensorboard~=2.5->tensorflow) (0.2.8)
Requirement already satisfied: cachetools<5.0,>=2.0.0 in c:\
programdata\anaconda3\lib\site-packages (from google-auth<2,>=1.6.3-
>tensorboard~=2.5->tensorflow) (4.2.2)
Requirement already satisfied: rsa<5,>=3.1.4 in c:\programdata\
anaconda3\lib\site-packages (from google-auth<2,>=1.6.3-
>tensorboard~=2.5->tensorflow) (4.7.2)
Requirement already satisfied: requests-oauthlib>=0.7.0 in c:\
programdata\anaconda3\lib\site-packages (from google-auth-
oauthlib<0.5,>=0.4.1->tensorboard~=2.5->tensorflow) (1.3.0)
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in c:\programdata\
anaconda3\lib\site-packages (from pyasn1-modules>=0.2.1->google-
```

```
auth<2,>=1.6.3->tensorboard~=2.5->tensorflow) (0.4.8)
Requirement already satisfied: certifi>=2017.4.17 in c:\programdata\
anaconda3\lib\site-packages (from requests<3,>=2.21.0-
>tensorboard~=2.5->tensorflow) (2020.12.5)
Requirement already satisfied: idna<3,>=2.5 in c:\programdata\
anaconda3\lib\site-packages (from requests<3,>=2.21.0-
>tensorboard~=2.5->tensorflow) (2.10)
Requirement already satisfied: chardet<5,>=3.0.2 in c:\programdata\
anaconda3\lib\site-packages (from requests<3,>=2.21.0-
>tensorboard~=2.5->tensorflow) (4.0.0)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\
programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0-
>tensorboard~=2.5->tensorflow) (1.26.4)
Requirement already satisfied: oauthlib>=3.0.0 in c:\programdata\
anaconda3\lib\site-packages (from requests-oauthlib>=0.7.0->google-
auth-oauthlib<0.5,>=0.4.1->tensorboard~=2.5->tensorflow) (3.1.1)
Installing collected packages: h5py, google-pasta, gast, flatbuffers,
astunparse, tensorflow
  Attempting uninstall: h5py
    Found existing installation: h5py 2.10.0
    Uninstalling h5py-2.10.0:

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM

---------------------------------------------------------------------
-----
ModuleNotFoundError                       Traceback (most recent call
last)
<ipython-input-7-b1bb00ef9978> in <module>
----> 1 from tensorflow.keras.models import Sequential
      2 from tensorflow.keras.layers import Dense
      3 from tensorflow.keras.layers import LSTM

ModuleNotFoundError: No module named 'tensorflow'

pip install tensorflow

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM

pip install tensorflow

pip install Tensorflow

Note: you may need to restart the kernel to use updated packages.

WARNING: Retrying (Retry(total=4, connect=None, read=None,
redirect=None, status=None)) after connection broken by
'NewConnectionError('<pip._vendor.urllib3.connection.HTTPSConnection
```

```
object at 0x000001E294122190>: Failed to establish a new connection:
[Errno 11001] getaddrinfo failed')': /simple/tensorflow/
WARNING: Retrying (Retry(total=3, connect=None, read=None,
redirect=None, status=None)) after connection broken by
'NewConnectionError('<pip._vendor.urllib3.connection.HTTPSConnection
object at 0x000001E2941223D0>: Failed to establish a new connection:
[Errno 11001] getaddrinfo failed')': /simple/tensorflow/
WARNING: Retrying (Retry(total=2, connect=None, read=None,
redirect=None, status=None)) after connection broken by
'NewConnectionError('<pip._vendor.urllib3.connection.HTTPSConnection
object at 0x000001E2941225B0>: Failed to establish a new connection:
[Errno 11001] getaddrinfo failed')': /simple/tensorflow/
WARNING: Retrying (Retry(total=1, connect=None, read=None,
redirect=None, status=None)) after connection broken by
'NewConnectionError('<pip._vendor.urllib3.connection.HTTPSConnection
object at 0x000001E294122790>: Failed to establish a new connection:
[Errno 11001] getaddrinfo failed')': /simple/tensorflow/
WARNING: Retrying (Retry(total=0, connect=None, read=None,
redirect=None, status=None)) after connection broken by
'NewConnectionError('<pip._vendor.urllib3.connection.HTTPSConnection
object at 0x000001E294122970>: Failed to establish a new connection:
[Errno 11001] getaddrinfo failed')': /simple/tensorflow/
ERROR: Could not find a version that satisfies the requirement
Tensorflow
ERROR: No matching distribution found for Tensorflow

pip install Tensorflow

C:\Users\eeksh>conda create -n tensorflow_env tensorflow

---------------------------------------------------------------------
-----
ModuleNotFoundError                       Traceback (most recent call
last)
<ipython-input-2-7e6e08dc792b> in <module>
----> 1 from Tensorflow.keras.models import Sequential
      2 from Tensorflow.keras.layers import Dense
      3 from Tensorflow.keras.layers import LSTM

ModuleNotFoundError: No module named 'Tensorflow'

pip install Tensorflow

conda create -n tensorflow_env tensorflow

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM

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

```
conda create -n tensorflow_env tensorflow

conda activate tensorflow_env

pip install tensorflow

conda create -n tensorflow_env tensorflow

X_train

pip install tensorflow

import tensorflow

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM

model= Sequential()

model=Sequential()
model.add(LSTM(50,return_sequences=True,input_shape=(10,1)))
model.add(LSTM(50,return_sequences=True))
model.add(LSTM(50))
model.add(Dense(1))
model.compile(loss='mean_squared_error',optimizer='adam')

model.add(Dense(1))

model.summary()

Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
lstm_4 (LSTM)                (None, 10, 50)            10400
_________________________________________________________________
lstm_5 (LSTM)                (None, 10, 50)            20200
_________________________________________________________________
lstm_6 (LSTM)                (None, 50)                20200
_________________________________________________________________
dense_1 (Dense)              (None, 1)                 51
=================================================================
Total params: 50,851
Trainable params: 50,851
Non-trainable params: 0
_________________________________________________________________

model.compile(loss='mean_squared_error',optimizer='adam')

model.fit(X_train,y_train,validation_data=(X_test,ytest),epochs=200,ba
tch_size=64,verbose=1)
```

```
Epoch 1/200
173/173 [==============================] - 16s 36ms/step - loss:
0.0308 - val_loss: 0.0038
Epoch 2/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0039
Epoch 3/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0039
Epoch 4/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0040
Epoch 5/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0038
Epoch 6/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0036
- val_loss: 0.0041
Epoch 7/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0038
Epoch 8/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0037
Epoch 9/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0035
- val_loss: 0.0038
Epoch 10/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0034
- val_loss: 0.0039
Epoch 11/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0035
- val_loss: 0.0041
Epoch 12/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0035
- val_loss: 0.0041
Epoch 13/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0034
- val_loss: 0.0036
Epoch 14/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0034
- val_loss: 0.0038
Epoch 15/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0035
- val_loss: 0.0036
Epoch 16/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0034
- val_loss: 0.0044
Epoch 17/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0034
```

```
- val_loss: 0.0037
Epoch 18/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0034
- val_loss: 0.0036
Epoch 19/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0035
- val_loss: 0.0035
Epoch 20/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0034
- val_loss: 0.0035
Epoch 21/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0035
- val_loss: 0.0039
Epoch 22/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0033
- val_loss: 0.0037
Epoch 23/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0034
- val_loss: 0.0039
Epoch 24/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0032
- val_loss: 0.0034
Epoch 25/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0033
- val_loss: 0.0034
Epoch 26/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0032
- val_loss: 0.0033
Epoch 27/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0032
- val_loss: 0.0032
Epoch 28/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0032
- val_loss: 0.0032
Epoch 29/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0031
- val_loss: 0.0032
Epoch 30/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0031
- val_loss: 0.0031
Epoch 31/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0031
- val_loss: 0.0031
Epoch 32/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0031
- val_loss: 0.0035
Epoch 33/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0031
- val_loss: 0.0031
Epoch 34/200
```

```
173/173 [==============================] - 5s 26ms/step - loss: 0.0031
- val_loss: 0.0031
Epoch 35/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0030
- val_loss: 0.0034
Epoch 36/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0031
- val_loss: 0.0031
Epoch 37/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0030
- val_loss: 0.0032
Epoch 38/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0030
- val_loss: 0.0030
Epoch 39/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0030
- val_loss: 0.0031
Epoch 40/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0030
- val_loss: 0.0032
Epoch 41/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0030
- val_loss: 0.0031
Epoch 42/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0030
- val_loss: 0.0031
Epoch 43/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0030
- val_loss: 0.0036
Epoch 44/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0030
- val_loss: 0.0033
Epoch 45/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0029
- val_loss: 0.0036
Epoch 46/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0030
- val_loss: 0.0029
Epoch 47/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0029
- val_loss: 0.0032
Epoch 48/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0029
- val_loss: 0.0031
Epoch 49/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 50/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0030
- val_loss: 0.0029
```

```
Epoch 51/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 52/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0029
- val_loss: 0.0029
Epoch 53/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0029
- val_loss: 0.0031
Epoch 54/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0029
- val_loss: 0.0029
Epoch 55/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 56/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0028
- val_loss: 0.0031
Epoch 57/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 58/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0028
- val_loss: 0.0032
Epoch 59/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0028
- val_loss: 0.0034
Epoch 60/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0029
- val_loss: 0.0034
Epoch 61/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 62/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 63/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 64/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0028
- val_loss: 0.0029
Epoch 65/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
- val_loss: 0.0029
Epoch 66/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0028
- val_loss: 0.0033
Epoch 67/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
```

```
- val_loss: 0.0030
Epoch 68/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
- val_loss: 0.0029
Epoch 69/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 70/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
- val_loss: 0.0034
Epoch 71/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0033
Epoch 72/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0029
- val_loss: 0.0030
Epoch 73/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0032
Epoch 74/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0028
- val_loss: 0.0031
Epoch 75/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 76/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0028
- val_loss: 0.0031
Epoch 77/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 78/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 79/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
- val_loss: 0.0032
Epoch 80/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 81/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 82/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0027
- val_loss: 0.0032
Epoch 83/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 84/200
```

```
173/173 [==============================] - 4s 25ms/step - loss: 0.0027
- val_loss: 0.0032
Epoch 85/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 86/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 87/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 88/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 89/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 90/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0027
- val_loss: 0.0029
Epoch 91/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0028
- val_loss: 0.0032
Epoch 92/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0028
- val_loss: 0.0030
Epoch 93/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0029
Epoch 94/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0032
Epoch 95/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 96/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 97/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 98/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 99/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0029
Epoch 100/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0027
- val_loss: 0.0032
```

```
Epoch 101/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0026
- val_loss: 0.0031
Epoch 102/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 103/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0032
Epoch 104/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0029
Epoch 105/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 106/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 107/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0032
Epoch 108/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0031
Epoch 109/200
173/173 [==============================] - 5s 29ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 110/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0029
Epoch 111/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 112/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0029
Epoch 113/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 114/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 115/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 116/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0029
Epoch 117/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
```

```
- val_loss: 0.0030
Epoch 118/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0031
Epoch 119/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0032
Epoch 120/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0029
Epoch 121/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0031
Epoch 122/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0029
Epoch 123/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0029
Epoch 124/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0026
- val_loss: 0.0028
Epoch 125/200
173/173 [==============================] - 5s 28ms/step - loss: 0.0025
- val_loss: 0.0032
Epoch 126/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0027
- val_loss: 0.0030
Epoch 127/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0025
- val_loss: 0.0029
Epoch 128/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0025
- val_loss: 0.0029
Epoch 129/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0025
- val_loss: 0.0028
Epoch 130/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0025
- val_loss: 0.0030
Epoch 131/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0025
- val_loss: 0.0030
Epoch 132/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0025
- val_loss: 0.0027
Epoch 133/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0024
- val_loss: 0.0028
Epoch 134/200
```

```
173/173 [==============================] - 4s 26ms/step - loss: 0.0025
- val_loss: 0.0029
Epoch 135/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0024
- val_loss: 0.0030
Epoch 136/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 137/200
173/173 [==============================] - 4s 26ms/step - loss: 0.0025
- val_loss: 0.0028
Epoch 138/200
173/173 [==============================] - 5s 27ms/step - loss: 0.0024
- val_loss: 0.0028
Epoch 139/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0033
Epoch 140/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0030
Epoch 141/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 142/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0030
Epoch 143/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 144/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0030
Epoch 145/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 146/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 147/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 148/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 149/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0030
Epoch 150/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
```

```
Epoch 151/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 152/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 153/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 154/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 155/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 156/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0028
Epoch 157/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 158/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0024
- val_loss: 0.0028
Epoch 159/200

173/173 [==============================] - 4s 23ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 160/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0030
Epoch 161/200
173/173 [==============================] - 4s 23ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 162/200
173/173 [==============================] - 4s 23ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 163/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 164/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 165/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 166/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 167/200
```

```
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0029
Epoch 168/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 169/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 170/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 171/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 172/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 173/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 174/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0024
- val_loss: 0.0028
Epoch 175/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 176/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 177/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 178/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 179/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 180/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 181/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 182/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 183/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0031
```

```
Epoch 184/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 185/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 186/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 187/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 188/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0031
Epoch 189/200
173/173 [==============================] - 5s 26ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 190/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0027
Epoch 191/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 192/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 193/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0029
Epoch 194/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 195/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0022
- val_loss: 0.0029
Epoch 196/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0030
Epoch 197/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0022
- val_loss: 0.0028
Epoch 198/200
173/173 [==============================] - 4s 24ms/step - loss: 0.0022
- val_loss: 0.0028
Epoch 199/200
173/173 [==============================] - 4s 25ms/step - loss: 0.0023
- val_loss: 0.0028
Epoch 200/200
```

```
173/173 [==============================] - 4s 24ms/step - loss: 0.0023
- val_loss: 0.0030

<tensorflow.python.keras.callbacks.History at 0x18304536b80>

X_train

array([[[0.84962779],
        [0.8674938 ],
        [0.79404467],
        ...,
        [0.77617866],
        [0.85260546],
        [0.8764268 ]],

       [[0.8674938 ],
        [0.79404467],
        [0.82133995],
        ...,
        [0.85260546],
        [0.8764268 ],
        [0.86004963]],

       [[0.79404467],
        [0.82133995],
        [0.85210918],
        ...,
        [0.8764268 ],
        [0.86004963],
        [0.75880893]],

       ...,

       [[0.91116625],
        [0.93647643],
        [0.90471464],
        ...,
        [0.94342432],
        [0.9235732 ],
        [0.9325062 ]],

       [[0.93647643],
        [0.90471464],
        [0.91662531],
        ...,
        [0.9235732 ],
        [0.9325062 ],
        [0.90769231]],

       [[0.90471464],
```

```
        [0.91662531],
        [0.90818859],
        ...,
        [0.9325062 ],
        [0.90769231],
        [0.93101737]]])
```

```
93.23669844194623
```

```
from tensorflow.keras.models import load_model

model.save("sales_forecast.h5")

def predict():
    look_back=10
    trainPredictPlot = np.empty_like(Sales_y)
    trainPredictPlot[:, :] = np.nan
    trainPredictPlot[look_back:len(train_predict)+look_back, :] =
train_predict
    testPredictPlot = np.empty_like(Sales_y)
    testPredictPlot[:, :] = np.nan
    testPredictPlot[len(train_predict)+(look_back*2)+1:len(Sales_y)-1,
:] = test_predict
    plt.plot(scaler.inverse_transform(Sales_y))
    plt.plot(trainPredictPlot)
    plt.plot(testPredictPlot)
    plt.show()

len(Sales)
```

```
17536
```

```
X_input=Sales[4372:4382].reshape(1,-1)
X_input.shape

---------------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
<ipython-input-160-cee7af4084aa> in <module>
----> 1 X_input=Sales[4372:4382].reshape(1,-1)
      2 X_input.shape

C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\generic.py in
__getattr__(self, name)
   5463             if
self._info_axis._can_hold_identifiers_and_holds_name(name):
   5464                 return self[name]
-> 5465             return object.__getattribute__(self, name)
   5466
```

```
   5467     def __setattr__(self, name: str, value) -> None:

AttributeError: 'DataFrame' object has no attribute 'reshape'
```

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

from tensorflow.keras.models import load_model

model.save("sales_forecast.h5")

def predict():
    look_back=10
    trainPredictPlot = np.empty_like(Sales_y)
    trainPredictPlot[:, :] = np.nan
    trainPredictPlot[look_back:len(train_predict)+look_back, :] =
train_predict
    testPredictPlot = np.empty_like(Sales_y)
    testPredictPlot[:, :] = np.nan
    testPredictPlot[len(train_predict)+(look_back*2)+1:len(Sales_y)-1,
:] = test_predict
    plt.plot(scaler.inverse_transform(Sales_y))
    plt.plot(trainPredictPlot)
    plt.plot(testPredictPlot)
    plt.show()

len(Sales)

17536

x_input=Sales[4372:4382].reshape(1,-1)
x_input.shape()

---------------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
<ipython-input-166-a87e4b29aaf9> in <module>
----> 1 x_input=Sales[4372:4382].reshape(1,-1)
      2 x_input.shape()

C:\ProgramData\Anaconda3\lib\site-packages\pandas\core\generic.py in
__getattr__(self, name)
   5463             if
self._info_axis._can_hold_identifiers_and_holds_name(name):
   5464                 return self[name]
-> 5465             return object.__getattribute__(self, name)
   5466
   5467     def __setattr__(self, name: str, value) -> None:

AttributeError: 'DataFrame' object has no attribute 'reshape'
```

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

def reshape():
    temp_input
```

```
  File "<ipython-input-69-d890455cbf91>", line 18
    print result
          ^
SyntaxError: Missing parentheses in call to 'print'. Did you mean
print(result)?
```

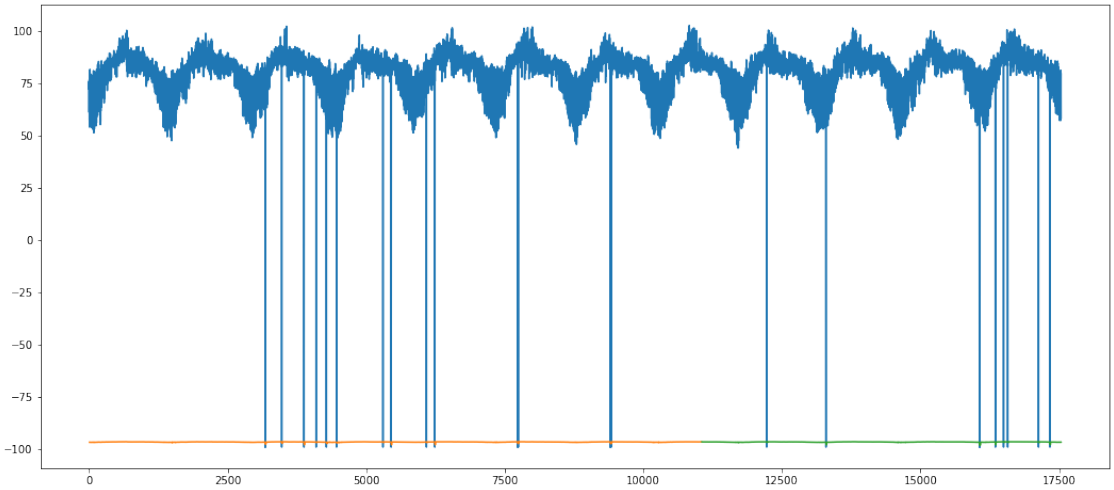
```
train_predict=model.predict(X_train)
test_predict=model.predict(X_test)

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

import math
from sklearn.metrics import mean_squared_error
math.sqrt(mean_squared_error(y_train,train_predict))
```

```
97.45316233309372
```

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

```
97.45149193238093
```

```
### Plotting
# shift train predictions for plotting
look_back=10
trainPredictPlot = np.empty_like(Sales_y)
trainPredictPlot[:, :] = np.nan
trainPredictPlot[look_back:len(train_predict)+look_back, :] =
train_predict
# shift test predictions for plotting
testPredictPlot = np.empty_like(Sales_y)
testPredictPlot[:, :] = np.nan
testPredictPlot[len(train_predict)+(look_back*2)+1:len(Sales_y)-1, :]
= test_predict
# plot baseline and predictions
plt.plot(scaler.inverse_transform(Sales_y))
plt.plot(trainPredictPlot)
plt.plot(testPredictPlot)
plt.show()
```




```
model.save("sales_forecast.h5")
```

```
len(Sales)
```

```
17536
```

```
Sales=np.array(Sales)
```

```
x_input=Sales[4372:4382].reshape(1,-1)
x_input.shape
```

```
(1, 10)
```

```
x_input
```

```
array([[53.3, 62.1, 74.8, 77.1, 75.2, 78.1, 53.4, 61.1, 76.1, 50.2]])
```

```
len(test_dataset)
```

```
6489
```

```
x_input=test_dataset[1612:].reshape(1,-1)
x_input.shape
```

```
(1, 4877)
```

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

```
temp_input
```

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 ...]

from numpy import array
lst_output=[]
n_steps=10
i=0
while(i<10):
```

```
    if(len(temp_input)>=10):
        x_input=np.array(temp_input[0:])
        print("{} day input {}".format(i,x_input))
        x_input=np.expand_dims(x_input, axis=0)
        x_input=scaler.transform(x_input)
        x_input = x_input.reshape((1, n_steps, 1))
        yhat = model.predict(x_input, verbose=0)
        yhat=scaler.inverse_transform(yhat)
        print("{} day output {}".format(i,yhat))
        temp_input.extend(yhat[0].tolist())
        temp_input=temp_input[1:]
        #print(temp_input)
        lst_output.extend(yhat.tolist())
        i=i+1
    else:
        print("Please give 10 number of inputs")
```

```
0 day input [0.91861042 0.90223325 0.91861042 ... 0.88684864
0.82431762 0.78064516]

---------------------------------------------------------------------------
-----
ValueError                                Traceback (most recent call
last)
<ipython-input-188-20b2bffc02bb> in <module>
      9         print("{} day input {}".format(i,x_input))
     10         x_input=np.expand_dims(x_input, axis=0)
---> 11         x_input=scaler.transform(x_input)
     12         x_input = x_input.reshape((1, n_steps, 1))
     13         yhat = model.predict(x_input, verbose=0)

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\preprocessing\
_data.py in transform(self, X)
    432         check_is_fitted(self)
    433
--> 434         X = self._validate_data(X, copy=self.copy,
dtype=FLOAT_DTYPES,
    435                                 force_all_finite="allow-nan",
reset=False)
    436

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_validate_data(self, X, y, reset, validate_separately, **check_params)
    435
    436         if check_params.get('ensure_2d', True):
--> 437             self._check_n_features(X, reset=reset)
    438
    439         return out
```

```
C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_check_n_features(self, X, reset)
    363
    364         if n_features != self.n_features_in_:
--> 365             raise ValueError(
    366                 f"X has {n_features} features, but
{self.__class__.__name__} "
    367                 f"is expecting {self.n_features_in_} features
as input.")

ValueError: X has 4877 features, but MinMaxScaler is expecting 1
features as input.
```

```
len(temp_input)
```

```
4877
```

```
from numpy import array
lst_output=[]
n_steps=10
i=0
while(i<10):

    if(len(temp_input)>=10):
        #print("temp_input",temp_input)
        x_input=np.array(temp_input[0:])
        print("{} day input {}".format(i,x_input))
        x_input=np.expand_dims(x_input, axis=0)
        x_input=scaler.transform(x_input)
        x_input = x_input.reshape((1, n_steps, 1))
        yhat = model.predict(x_input, verbose=0)
        yhat=scaler.inverse_transform(yhat)
        print("{} day output {}".format(i,yhat))
        temp_input.extend(yhat[0].tolist())
        temp_input=temp_input[1:]
        #print(temp_input)
        lst_output.extend(yhat.tolist())
        i=i+1
    else:
        print("Please give 10 number of inputs")
```

```
0 day input [0.91861042 0.90223325 0.91861042 ... 0.88684864
0.82431762 0.78064516]

---------------------------------------------------------------------
-----
ValueError                                Traceback (most recent call
last)
<ipython-input-193-d63aa09e70f4> in <module>
     10         print("{} day input {}".format(i,x_input))
     11         x_input=np.expand_dims(x_input, axis=0)
```

```
---> 12         x_input=scaler.transform(x_input)
     13         x_input = x_input.reshape((1, n_steps, 1))
     14         yhat = model.predict(x_input, verbose=0)

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\preprocessing\
_data.py in transform(self, X)
    432         check_is_fitted(self)
    433
--> 434         X = self._validate_data(X, copy=self.copy,
dtype=FLOAT_DTYPES,
    435                                 force_all_finite="allow-nan",
reset=False)
    436

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_validate_data(self, X, y, reset, validate_separately, **check_params)
    435
    436         if check_params.get('ensure_2d', True):
--> 437             self._check_n_features(X, reset=reset)
    438
    439         return out

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_check_n_features(self, X, reset)
    363
    364         if n_features != self.n_features_in_:
--> 365             raise ValueError(
    366                 f"X has {n_features} features, but
{self.__class__.__name__} "
    367                 f"is expecting {self.n_features_in_} features
as input.")

ValueError: X has 4877 features, but MinMaxScaler is expecting 1
features as input.
```

```
y_pred = model.predict(X_test,batch_size=1)
```

```
y_pred[0:5]
```

```
array([[0.00865376],
       [0.00861295],
       [0.00860143],
       [0.00861505],
       [0.00860534]], dtype=float32)
```

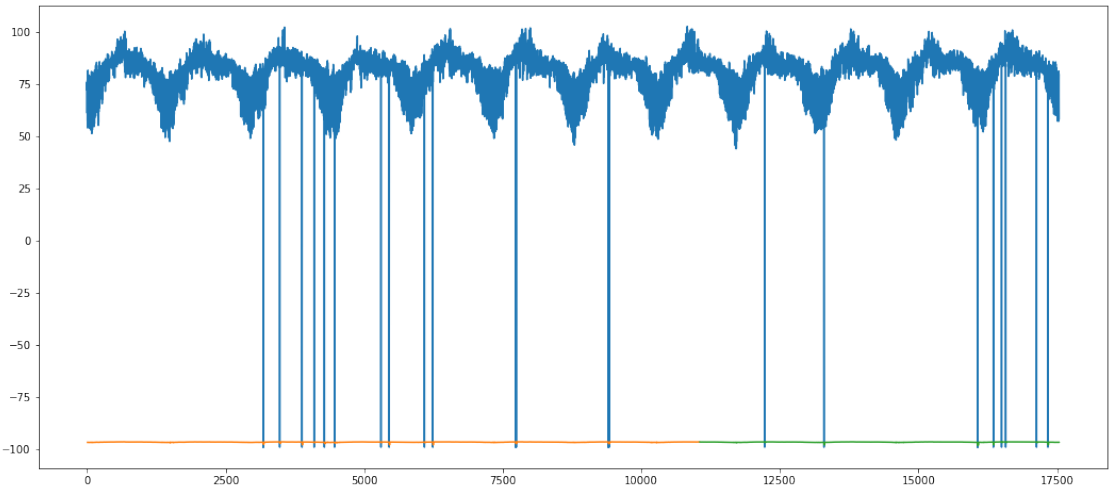
```
import math
from sklearn.metrics import mean_squared_error
math.sqrt(mean_squared_error(y_train,train_predict))
```

```
97.45316233309372
```

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

```
97.45149193238093
```

```
### Plotting
# shift train predictions for plotting
look_back=10
trainPredictPlot = np.empty_like(Sales_y)
trainPredictPlot[:, :] = np.nan
trainPredictPlot[look_back:len(train_predict)+look_back, :] =
train_predict
# shift test predictions for plotting
testPredictPlot = np.empty_like(Sales_y)
testPredictPlot[:, :] = np.nan
testPredictPlot[len(train_predict)+(look_back*2)+1:len(Sales_y)-1, :]
= test_predict
# plot baseline and predictions
plt.plot(scaler.inverse_transform(Sales_y))
plt.plot(trainPredictPlot)
plt.plot(testPredictPlot)
plt.show()
```




```
model.save("sales_forecast.h5")
```

```
len(Sales)
```

```
17536
```

```
Sales=np.array(Sales)
```

```
x_input=Sales[4372:4382].reshape(1,-1)
x_input.shape
```

```
(1, 10)
```

```
x_input
```

```
array([[53.3, 62.1, 74.8, 77.1, 75.2, 78.1, 53.4, 61.1, 76.1, 50.2]])
```

```
len(test_dataset)
```

```
6489
```

```
x_input=test_dataset[1612:].reshape(1,-1)
x_input.shape
```

```
(1, 4877)
```

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

```
temp_input
```

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 0.9295285359801488,
 0.9280397022332506,
 0.9374689826302729,
 0.9066997518610422,
 ...]
```

```
len(temp_input)
```

```
4877
```

```
from numpy import array
lst_output=[]
n_steps=10
i=0
while(i<10):

    if(len(temp_input)>=10):
        #print("temp_input",temp_input)
        x_input=np.array(temp_input[0:])
        print("{} day input {}".format(i,x_input))
        x_input=np.expand_dims(x_input, axis=0)
        x_input=scaler.transform(x_input)
        x_input = x_input.reshape((1, n_steps, 1))
        yhat = model.predict(x_input, verbose=0)
        yhat=scaler.inverse_transform(yhat)
        print("{} day output {}".format(i,yhat))
        temp_input.extend(yhat[0].tolist())
        temp_input=temp_input[1:]
        #print(temp_input)
        lst_output.extend(yhat.tolist())
        i=i+1
    else:
        print("Please give 10 number of inputs")
```

```
0 day input [0.91861042 0.90223325 0.91861042 ... 0.88684864
0.82431762 0.78064516]

---------------------------------------------------------------------------
-----
ValueError                                Traceback (most recent call
last)
```

```
<ipython-input-211-d63aa09e70f4> in <module>
     10         print("{} day input {}".format(i,x_input))
     11         x_input=np.expand_dims(x_input, axis=0)
---> 12         x_input=scaler.transform(x_input)
     13         x_input = x_input.reshape((1, n_steps, 1))
     14         yhat = model.predict(x_input, verbose=0)

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\preprocessing\
_data.py in transform(self, X)
    432         check_is_fitted(self)
    433
--> 434         X = self._validate_data(X, copy=self.copy,
dtype=FLOAT_DTYPES,
    435                                 force_all_finite="allow-nan",
reset=False)
    436

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_validate_data(self, X, y, reset, validate_separately, **check_params)
    435
    436         if check_params.get('ensure_2d', True):
--> 437             self._check_n_features(X, reset=reset)
    438
    439         return out

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_check_n_features(self, X, reset)
    363
    364         if n_features != self.n_features_in_:
--> 365             raise ValueError(
    366                 f"X has {n_features} features, but
{self.__class__.__name__} "
    367                 f"is expecting {self.n_features_in_} features
as input.")

ValueError: X has 4877 features, but MinMaxScaler is expecting 1
features as input.
```

```
day_new=np.arange(1,11)
day_pred=np.arange(11,21)
```

```
len(Sales_y)
```

```
17536
```

```
import jupyterthemes as jt
!jt -t monokai
```

```
-------------------------------------------------------------------
-----
```

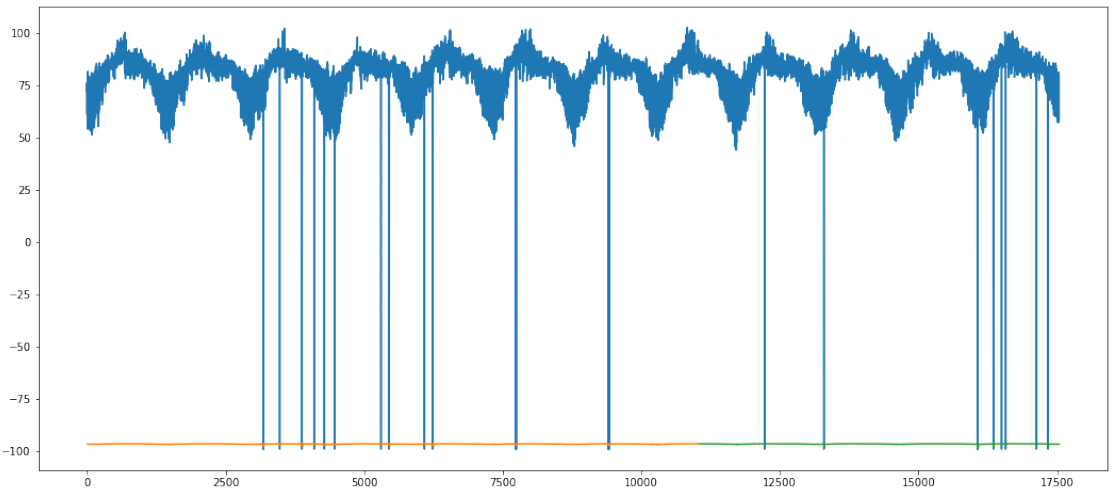
```
ModuleNotFoundError                       Traceback (most recent call
last)
<ipython-input-214-a904a99c3ad9> in <module>
----> 1 import jupyterthemes as jt
      2 get_ipython().system('jt -t monokai')

ModuleNotFoundError: No module named 'jupyterthemes'
```

```
!jt -r
```

```
'jt' is not recognized as an internal or external command,
operable program or batch file.
```

```
### Plotting
# shift train predictions for plotting
look_back=10
trainPredictPlot = np.empty_like(Sales_y)
trainPredictPlot[:, :] = np.nan
trainPredictPlot[look_back:len(train_predict)+look_back, :] =
train_predict
# shift test predictions for plotting
testPredictPlot = np.empty_like(Sales_y)
testPredictPlot[:, :] = np.nan
testPredictPlot[len(train_predict)+(look_back*2)+1:len(Sales_y)-1, :]
= test_predict
# plot baseline and predictions
plt.plot(scaler.inverse_transform(Sales_y))
plt.plot(trainPredictPlot)
plt.plot(testPredictPlot)
plt.show()
```




```
len(Sales)
```

```
17536
```

```
x_input=Sales[4372:4382].reshape(1,-1)
x_input.shape
```

```
(1, 10)
```

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

```
temp_input
```

```
[53.3, 62.1, 74.8, 77.1, 75.2, 78.1, 53.4, 61.1, 76.1, 50.2]
```

```
from numpy import array
lst_output=[]
n_steps=10
i=0
while(i<10):

    if(len(temp_input)>=10):
        #print("temp_input",temp_input)
        x_input=np.array(temp_input[0:])
        print("{} day input {}".format(i,x_input))
        x_input=np.expand_dims(x_input, axis=0)
        x_input=scaler.transform(x_input)
        x_input = x_input.reshape((1, n_steps, 1))
        yhat = model.predict(x_input, verbose=0)
        yhat=scaler.inverse_transform(yhat)
        print("{} day output {}".format(i,yhat))
        temp_input.extend(yhat[0].tolist())
        temp_input=temp_input[1:]
        #print(temp_input)
        lst_output.extend(yhat.tolist())
        i=i+1
    else:
        print("Please give 10 number of inputs")
```

```
0 day input [53.3 62.1 74.8 77.1 75.2 78.1 53.4 61.1 76.1 50.2]

---------------------------------------------------------------------------
-----
ValueError                                Traceback (most recent call
last)
<ipython-input-223-d63aa09e70f4> in <module>
     10         print("{} day input {}".format(i,x_input))
     11         x_input=np.expand_dims(x_input, axis=0)
---> 12         x_input=scaler.transform(x_input)
     13         x_input = x_input.reshape((1, n_steps, 1))
     14         yhat = model.predict(x_input, verbose=0)

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\preprocessing\
_data.py in transform(self, X)
    432         check_is_fitted(self)
```

```
    433
--> 434         X = self._validate_data(X, copy=self.copy,
dtype=FLOAT_DTYPES,
    435                                 force_all_finite="allow-nan",
reset=False)
    436

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_validate_data(self, X, y, reset, validate_separately, **check_params)
    435
    436         if check_params.get('ensure_2d', True):
--> 437             self._check_n_features(X, reset=reset)
    438
    439         return out

C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py in
_check_n_features(self, X, reset)
    363
    364         if n_features != self.n_features_in_:
--> 365             raise ValueError(
    366                 f"X has {n_features} features, but
{self.__class__.__name__} "
    367                 f"is expecting {self.n_features_in_} features
as input.")

ValueError: X has 10 features, but MinMaxScaler is expecting 1
features as input.
```