

MODEL BUILDING-ADDING OUTPUT LAYERS

```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

In [2]: data=pd.read_excel("/content/Crude Oil Prices Daily.xlsx")

In [3]: data.isnull().any()

Out[3]: Date          False
Closing Value      True
dtype: bool

In [4]: data.isnull().sum()

Out[4]: Date          0
Closing Value      7
dtype: int64

In [5]: data.dropna(axis=0,inplace=True)

In [6]: data.isnull().sum()

Out[6]: Date          0
Closing Value      0
dtype: int64

In [7]: data_oil=data.reset_index()['Closing Value']
data_oil

Out[7]: 0      25.56
1      26.00
2      26.53

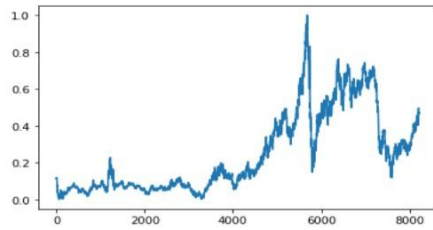
4      25.87
..
8211    73.89
8212    74.19
8213    73.05
8214    73.78
8215    73.93
Name: Closing Value, Length: 8216, dtype: float64

In [8]: from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler(feature_range=(0,1))
data_oil=scaler.fit_transform(np.array(data_oil).reshape(-1,1))

In [9]: data_oil

Out[9]: array([[0.11335703],
 [0.11661484],
 [0.12053902],
 ...,
 [0.46497853],
 [0.47038353],
 [0.47149415]])

In [10]: plt.plot(data_oil)
```



```
In [11]: training_size=int(len(data_oil)*0.65)
test_size=len(data_oil)-training_size
train_data,test_data=data_oil[0:training_size:],data_oil[training_size:len(data_oil),:1]
```

```
In [12]: training_size,test_size
```

```
Out[12]: (5340, 2876)
```

```
In [13]: train_data.shape
```

```
Out[13]: (5340, 1)
```

```
In [14]: 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)
```

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```

```
In [15]: time_step=10
x_train,y_train=create_dataset(train_data,time_step)
x_test,y_test=create_dataset(test_data,time_step)
```

```
In [16]: print(x_train.shape),print(y_train.shape)
```

```
(5329, 10)
(5329,)
```

```
Out[16]: (None, None)
```

```
In [17]: print(x_test.shape),print(y_test.shape)
```

```
(2865, 10)
(2865,)
```

```
Out[17]: (None, None)
```

```
In [18]: x_train
```

```
Out[18]: array([[0.11335703, 0.11661484, 0.12053902, ..., 0.10980305, 0.1089886 ,
 0.11054346],
 [0.11661484, 0.12053902, 0.11550422, ..., 0.1089886 , 0.11054346,
 0.10165852],
 [0.12053902, 0.11550422, 0.1156523 , ..., 0.11054346, 0.10165852,
 0.09906708],
 ...,
 [0.36731823, 0.35176958, 0.36080261, ..., 0.36391234, 0.37042796,
 0.37042796],
 [0.35176958, 0.36080261, 0.35354657, ..., 0.37042796, 0.37042796,
 0.37879461],
 [0.36080261, 0.35354657, 0.35295424, ..., 0.37042796, 0.37879461,
 0.37916482]])
```

```
In [19]: x_train=x_train.reshape(x_train.shape[0],x_train.shape[1],1)
x_test=x_test.reshape(x_test.shape[0],x_test.shape[1],1)
```

```
In [20]: from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import LSTM
```

```
In [22]: model=Sequential()
```

```
In [23]: model.add(LSTM(50,return_sequences=True,input_shape=(10,1)))
model.add(LSTM(50,return_sequences=True))
model.add(LSTM(50))
```

```
In [24]: model.add(Dense(1))
```

```
In [25]: model.summary()
```

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```
In [25]: model.summary()
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
=====		
lstm (LSTM)	(None, 10, 50)	10400
lstm_1 (LSTM)	(None, 10, 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		
