

## MODEL BUILDING – Adding LSTM Layers

TEAM ID	PNT2022TMID01583
PROJECT NAME	CRUDE OIL PRICE PREDICTION

```
import numpy as np # Linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import datetime
from pylab import rcParams
import matplotlib.pyplot as plt
import warnings
import itertools
import statsmodels.api as sm
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import LSTM
from keras.layers import Dropout
from sklearn.metrics import mean_squared_error
from keras.callbacks import ReduceLROnPlateau, EarlyStopping, ModelCheckpoint
from sklearn.metrics import mean_squared_error
from sklearn.metrics import mean_absolute_error
import seaborn as sns
sns.set_context("paper", font_scale=1.3)
sns.set_style('white')
import math
from sklearn.preprocessing import MinMaxScaler
# Input data files are available in the "../input/" directory.
# For example, running this (by clicking run or pressing Shift+Enter) will list all files under the input directory
warnings.filterwarnings("ignore")
plt.style.use('fivethirtyeight')
import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

```

dateparse = lambda x: pd.datetime.strptime(x, '%b %d, %Y')
#Read csv file
from google.colab import files
uploaded = files.upload()
df = pd.read_csv('BrentOilPrices.csv',parse_dates=['Date'], date_parser=dateparse)
#Sort dataset by column Date
df = df.sort_values('Date')
df = df.groupby('Date')['Price'].sum().reset_index()
df.set_index('Date', inplace=True)
df=df.loc[datetime.date(year=2000,month=1,day=1):]

```

Jpload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.  
 Saving BrentOilPrices.csv to BrentOilPrices (1).csv

```
df.head()
```

	Price
Date	
2000-01-04	23.95
2000-01-05	23.72
2000-01-06	23.55
2000-01-07	23.35
2000-01-10	22.77

```

In [ ]: def DfInfo(df_initial):
# gives some infos on columns types and number of null values
tab_info = pd.DataFrame(df_initial.dtypes).T.rename(index={0: 'column type'})
tab_info = tab_info.append(pd.DataFrame(df_initial.isnull().sum()).T.rename(index={0: 'null values (nb)'}))
tab_info = tab_info.append(pd.DataFrame(df_initial.isnull().sum() / df_initial.shape[0] * 100).T.
                             rename(index={0: 'null values (%)'}))
return tab_info

```

```
In [ ]: DfInfo(df)
```

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Out[ ]:
```

	Price
column type	float64
null values (nb)	0
null values (%)	0.0

```
In [ ]: df.index
```

```

Out[ ]: DatetimeIndex(['2000-01-04', '2000-01-05', '2000-01-06', '2000-01-07',
                        '2000-01-10', '2000-01-11', '2000-01-12', '2000-01-13',
                        '2000-01-14', '2000-01-17',
                        ...,
                        '2019-09-17', '2019-09-18', '2019-09-19', '2019-09-20',
                        '2019-09-23', '2019-09-24', '2019-09-25', '2019-09-26',
                        '2019-09-27', '2019-09-30'],
                        dtype='datetime64[ns]', name='Date', length=5016, freq=None)

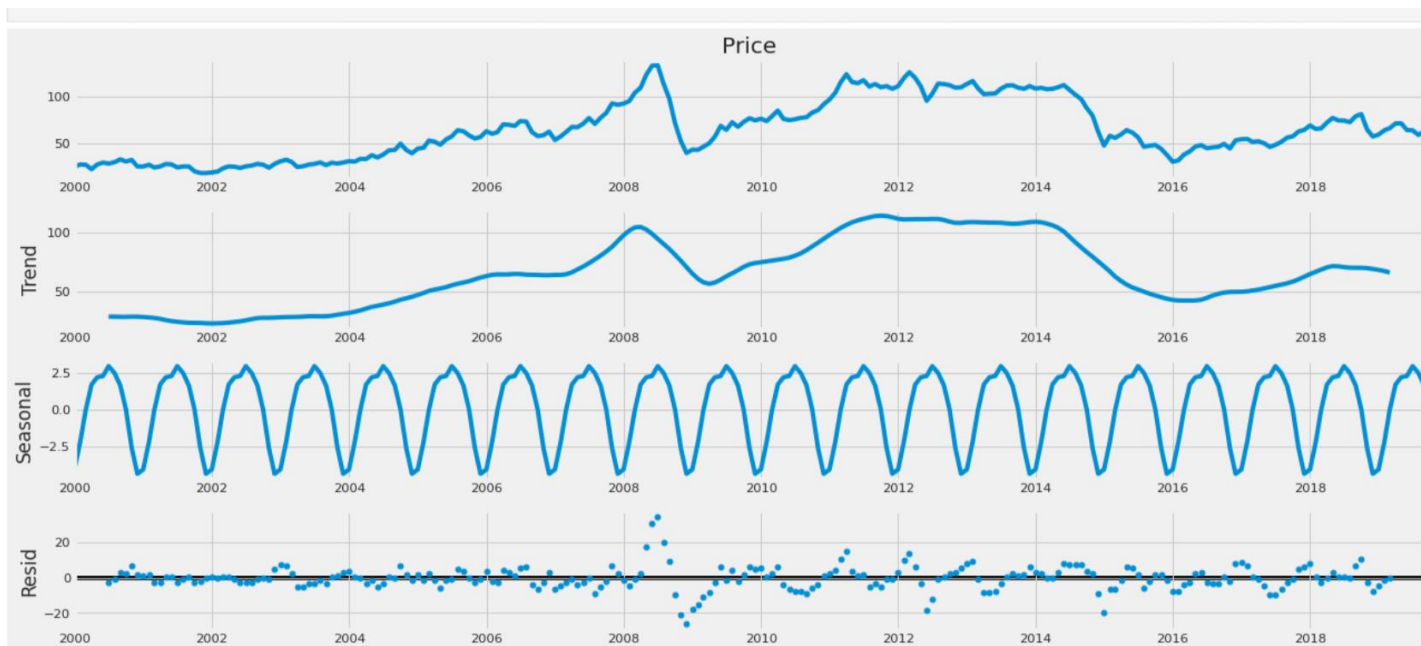
```

```
Tn [ ]:
```

```
In [ ]: y.plot(figsize=(15, 6))
plt.show()
```



```
In [ ]: rcParams['figure.figsize'] = 18, 8
decomposition = sm.tsa.seasonal_decompose(y, model='additive')
fig = decomposition.plot()
plt.show()
```



```
In [ ]: sc = MinMaxScaler(feature_range = (0, 1))
df = sc.fit_transform(df)
```

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```
In [ ]: train_size = int(len(df) * 0.70)
test_size = len(df) - train_size
train, test = df[0:train_size, :], df[train_size:len(df), :]
```

```
In [ ]: def create_data_set(_data_set, _look_back=1):
    data_x, data_y = [], []
    for i in range(len(_data_set) - _look_back - 1):
        a = _data_set[i:(i + _look_back), 0]
        data_x.append(a)
        data_y.append(_data_set[i + _look_back, 0])
    return np.array(data_x), np.array(data_y)
```

```
In [ ]: look_back = 90
X_train, Y_train, X_test, Y_test = [], [], [], []
X_train, Y_train = create_data_set(train, look_back)
X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], 1))
X_test, Y_test = create_data_set(test, look_back)
X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))
```

```
In [ ]: regressor = Sequential()

regressor.add(LSTM(units = 60, return_sequences = True, input_shape = (X_train.shape[1], 1)))
regressor.add(Dropout(0.1))

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regressor.add(LSTM(units = 60))
regressor.add(Dropout(0.1))

regressor.add(Dense(units = 1))

regressor.compile(optimizer = 'adam', loss = 'mean_squared_error')
reduce_lr = ReduceLROnPlateau(monitor='val_loss', patience=5)
history = regressor.fit(X_train, Y_train, epochs = 20, batch_size = 15, validation_data=(X_test, Y_test), callbacks=[reduce_lr], shuffle=False)
```