

TEAM ID: PNT2022TMID24389
PROJECT: Crude oil price prediction

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LSTM LAYER

```
In [18]: regressor = Sequential()

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

regressor.add(LSTM(units = 60, return_sequences = True))
regressor.add(Dropout(0.1))

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)

Epoch 1/20
212/212 [=====] - 20s 83ms/step - loss: 0.0046 - val_loss: 0.0264 - lr: 0.0010
Epoch 2/20
212/212 [=====] - 16s 73ms/step - loss: 0.0119 - val_loss: 0.0496 - lr: 0.0010
Epoch 3/20
212/212 [=====] - 19s 80ms/step - loss: 0.0119 - val_loss: 0.0572 - lr: 0.0010
Epoch 4/20
212/212 [=====] - 16s 76ms/step - loss: 0.0154 - val_loss: 0.0508 - lr: 0.0010
Epoch 5/20
212/212 [=====] - 17s 80ms/step - loss: 0.0178 - val_loss: 0.0457 - lr: 0.0010
Epoch 6/20
212/212 [=====] - 17s 78ms/step - loss: 0.0194 - val_loss: 0.0540 - lr: 0.0010
Epoch 7/20
212/212 [=====] - 16s 73ms/step - loss: 0.0290 - val_loss: 0.0038 - lr: 1.0000e-04
Epoch 8/20
```

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MODEL TRAINING

```
In [19]: train_predict = regressor.predict(X_train)
         test_predict = regressor.predict(X_test)

In [20]: train_predict = sc.inverse_transform(train_predict)
         Y_train = sc.inverse_transform([Y_train])
         test_predict = sc.inverse_transform(test_predict)
         Y_test = sc.inverse_transform([Y_test])
```

PREDICTION

```
In [21]: print('Train Mean Absolute Error:', mean_absolute_error(Y_train[0], train_predict[:,0]))
         print('Train Root Mean Squared Error:', np.sqrt(mean_squared_error(Y_train[0], train_predict[:,0])))
         print('Test Mean Absolute Error:', mean_absolute_error(Y_test[0], test_predict[:,0]))
         print('Test Root Mean Squared Error:', np.sqrt(mean_squared_error(Y_test[0], test_predict[:,0])))

         plt.figure(figsize=(8,4))
         plt.plot(history.history['loss'], label='Train Loss')
         plt.plot(history.history['val_loss'], label='Test Loss')
         plt.title('model loss')
         plt.ylabel('loss')
         plt.xlabel('epochs')
         plt.legend(locs='upper right')
         plt.show();
```

Train Mean Absolute Error: 3.096717261068475
Train Root Mean Squared Error: 3.8826918567298652
Test Mean Absolute Error: 2.7278705535818837
Test Root Mean Squared Error: 5.479474283362478



