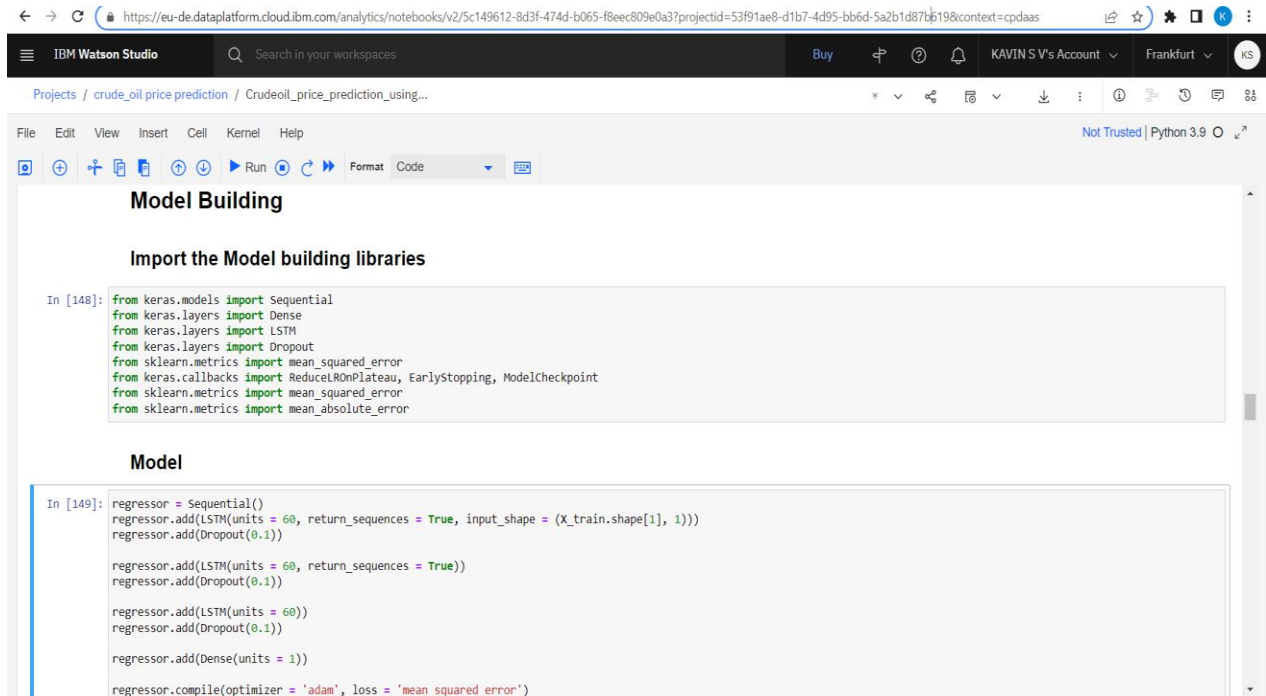


# TRAIN THE MODEL ON IBM



```
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Model Building

Import the Model building libraries

```
In [148]: 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
```

Model

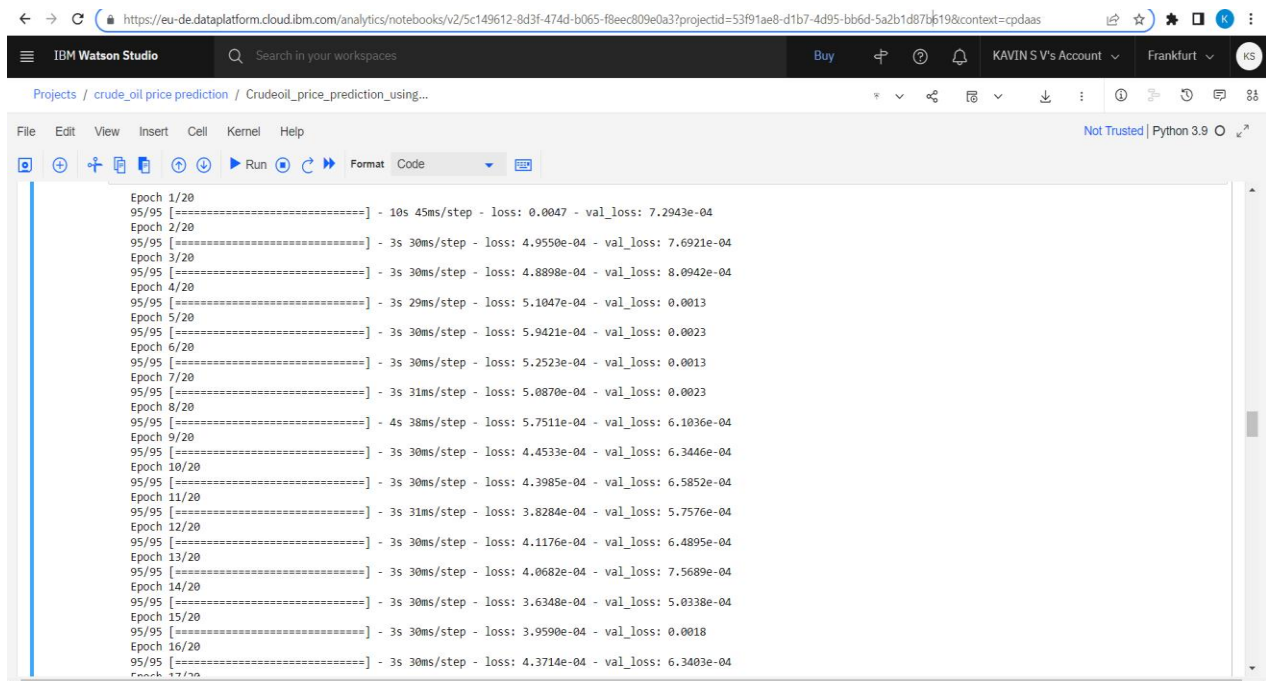
```
In [149]: regressor = Sequential()
regressor.add(LSTM(units = 60, return_sequences = True, input_shape = (X_train.shape[1], 1)))
regressor.add(Dropout(0.1))

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')
```



```
← → ↺ 🔒 https://eu-de.dataplatform.cloud.ibm.com/analytics/notebooks/v2/5c149612-8d3f-474d-b065-f8ec809e0a3?projectid=53f91ae8-d1b7-4d95-bb6d-5a2b1d87b198&context=cpdaas ☆ ⚙️ 👤 KAVIN S V's Account 📍 Frankfurt 👤 KS
```

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```
Epoch 1/20
95/95 [=====] - 10s 45ms/step - loss: 0.0047 - val_loss: 7.2943e-04
Epoch 2/20
95/95 [=====] - 3s 30ms/step - loss: 4.9550e-04 - val_loss: 7.6921e-04
Epoch 3/20
95/95 [=====] - 3s 30ms/step - loss: 4.8898e-04 - val_loss: 8.0942e-04
Epoch 4/20
95/95 [=====] - 3s 29ms/step - loss: 5.1047e-04 - val_loss: 0.0013
Epoch 5/20
95/95 [=====] - 3s 30ms/step - loss: 5.9421e-04 - val_loss: 0.0023
Epoch 6/20
95/95 [=====] - 3s 30ms/step - loss: 5.2523e-04 - val_loss: 0.0013
Epoch 7/20
95/95 [=====] - 3s 31ms/step - loss: 5.0070e-04 - val_loss: 0.0023
Epoch 8/20
95/95 [=====] - 4s 38ms/step - loss: 5.7511e-04 - val_loss: 6.1036e-04
Epoch 9/20
95/95 [=====] - 3s 30ms/step - loss: 4.4533e-04 - val_loss: 6.3446e-04
Epoch 10/20
95/95 [=====] - 3s 30ms/step - loss: 4.3985e-04 - val_loss: 6.5852e-04
Epoch 11/20
95/95 [=====] - 3s 31ms/step - loss: 3.8284e-04 - val_loss: 5.7576e-04
Epoch 12/20
95/95 [=====] - 3s 30ms/step - loss: 4.1176e-04 - val_loss: 6.4895e-04
Epoch 13/20
95/95 [=====] - 3s 30ms/step - loss: 4.0682e-04 - val_loss: 7.5689e-04
Epoch 14/20
95/95 [=====] - 3s 30ms/step - loss: 3.6348e-04 - val_loss: 5.0338e-04
Epoch 15/20
95/95 [=====] - 3s 30ms/step - loss: 3.9590e-04 - val_loss: 0.0018
Epoch 16/20
95/95 [=====] - 3s 30ms/step - loss: 4.3714e-04 - val_loss: 6.3403e-04
Epoch 17/20
```

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Format Code

### Train the model

```
In [150]: train_predict = regressor.predict(X_train)
test_predict = regressor.predict(X_test)

189/189 [=====] - 3s 7ms/step
102/102 [=====] - 1s 7ms/step
```

```
In [151]: # invert predictions
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])
```

### Model evaluation

```
In [152]: 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(loc='upper right')
plt.show();
```

Train Mean Absolute Error: 1.5004689769241186

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```
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(loc='upper right')
plt.show();
```

Train Mean Absolute Error: 1.5004689769241186  
Train Root Mean Squared Error: 2.03291747578067  
Test Mean Absolute Error: 2.1357170599548074  
Test Root Mean Squared Error: 2.9096238300262343

Epoch	Train Loss	Test Loss
0.0	0.0040	0.0005
2.5	0.0005	0.0008
5.0	0.0005	0.0020
7.5	0.0005	0.0008
10.0	0.0005	0.0008
12.5	0.0005	0.0008
15.0	0.0005	0.0010
17.5	0.0005	0.0008