

ImplementLSTM-Seq_Task

February 26, 2024

```
[1]: # Importing the libraries
import numpy as np
import matplotlib.pyplot as plt
plt.style.use('fivethirtyeight')
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
from keras.models import Sequential
from keras.layers import Dense, LSTM, Dropout, GRU, Bidirectional
from keras.optimizers import SGD
import math
from sklearn.metrics import mean_squared_error
```

2024-02-26 11:18:57.794420: I tensorflow/core/platform/cpu_feature_guard.cc:182]
This TensorFlow binary is optimized to use available CPU instructions in
performance-critical operations.
To enable the following instructions: SSE4.1 SSE4.2 AVX AVX2 AVX_VNNI FMA, in
other operations, rebuild TensorFlow with the appropriate compiler flags.

```
[2]: # Some functions to help out with
def plot_predictions(test,predicted):
    plt.plot(test, color='red',label='Real IBM Stock Price')
    plt.plot(predicted, color='blue',label='Predicted IBM Stock Price')
    plt.title('IBM Stock Price Prediction')
    plt.xlabel('Time')
    plt.ylabel('IBM Stock Price')
    plt.legend()
    plt.show()

def return_rmse(test,predicted):
    rmse = math.sqrt(mean_squared_error(test, predicted))
    print("The root mean squared error is {}".format(rmse))
```

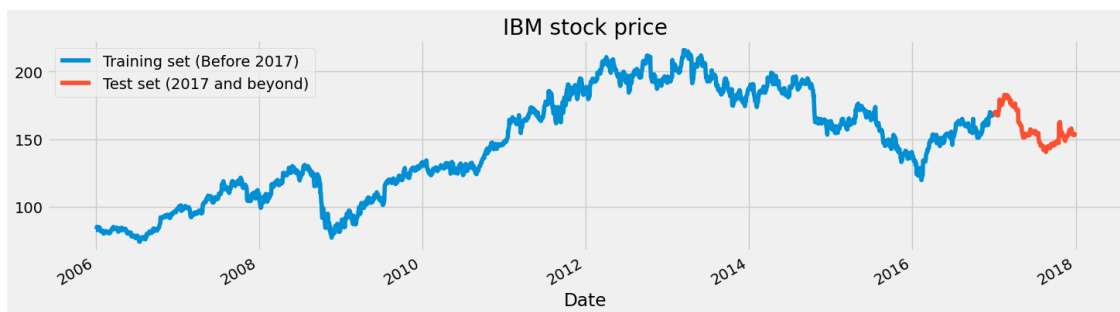
```
[4]: # First, we get the data
dataset = pd.read_csv('/home/nmit/Documents/IBM_2006-01-01_to_2018-01-01.csv',
    ↪index_col='Date', parse_dates=['Date'])
dataset.head()
```

```
[4]:
```

Date	Open	High	Low	Close	Volume	Name
2006-01-03	82.45	82.55	80.81	82.06	11715200	IBM
2006-01-04	82.20	82.50	81.33	81.95	9840600	IBM
2006-01-05	81.40	82.90	81.00	82.50	7213500	IBM
2006-01-06	83.95	85.03	83.41	84.95	8197400	IBM
2006-01-09	84.10	84.25	83.38	83.73	6858200	IBM

```
[5]: # Checking for missing values
training_set = dataset[:'2016'].iloc[:,1:2].values
test_set = dataset['2017:'].iloc[:,1:2].values
```

```
[6]: # We have chosen 'High' attribute for prices. Let's see what it looks like
dataset["High"][:'2016'].plot(figsize=(16,4),legend=True)
dataset["High"]['2017:'].plot(figsize=(16,4),legend=True)
plt.legend(['Training set (Before 2017)', 'Test set (2017 and beyond)'])
plt.title('IBM stock price')
plt.show()
```



```
[7]: # Scaling the training set
sc = MinMaxScaler(feature_range=(0,1))
training_set_scaled = sc.fit_transform(training_set)
```

```
[8]: # Since LSTMs store long term memory state, we create a data structure with 60
      ↪ timesteps and 1 output
      # So for each element of training set, we have 60 previous training set
      ↪ elements
X_train = []
y_train = []
for i in range(60,2769):
    X_train.append(training_set_scaled[i-60:i,0])
    y_train.append(training_set_scaled[i,0])
X_train, y_train = np.array(X_train), np.array(y_train)
```

```
[9]: # Reshaping X_train for efficient modelling
X_train = np.reshape(X_train, (X_train.shape[0],X_train.shape[1],1))
```

```
[10]: # The LSTM architecture
regressor = Sequential()
# First LSTM layer with Dropout regularisation
regressor.add(LSTM(units=50, return_sequences=True, input_shape=(X_train.
↪shape[1],1)))
regressor.add(Dropout(0.2))
# Second LSTM layer
regressor.add(LSTM(units=50, return_sequences=True))
regressor.add(Dropout(0.2))
# Third LSTM layer
regressor.add(LSTM(units=50, return_sequences=True))
regressor.add(Dropout(0.2))
# Fourth LSTM layer
regressor.add(LSTM(units=50))
regressor.add(Dropout(0.2))
# The output layer
regressor.add(Dense(units=1))

# Compiling the RNN
regressor.compile(optimizer='rmsprop',loss='mean_squared_error')
# Fitting to the training set
regressor.fit(X_train,y_train,epochs=50,batch_size=32)
```

```
2024-02-26 11:24:52.557569: I
tensorflow/core/common_runtime/process_util.cc:146] Creating new thread pool
with default inter op setting: 2. Tune using inter_op_parallelism_threads for
best performance.
2024-02-26 11:24:52.687053: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:52.687692: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
[[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:52.688198: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
```

2024-02-26 11:24:52.775293: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:24:52.776190: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:24:52.776791: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:24:52.865422: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:24:52.865983: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:24:52.866545: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:24:52.948110: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:24:52.948706: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:24:52.949277: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

Epoch 1/50

2024-02-26 11:24:53.116794: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:24:53.117939: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:24:53.118610: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:24:53.219260: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:24:53.219972: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:24:53.220629: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:24:53.320484: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with

```

dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:53.321477: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:53.322197: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:24:53.514763: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:53.515577: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:53.516221: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:24:54.172717: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:54.173852: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:54.174521: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with

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dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:24:54.272066: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:54.272820: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:54.273632: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:24:54.369135: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:54.369884: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:54.370519: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:24:54.471417: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:24:54.472378: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype

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```

int32
[[[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:24:54.473073: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
[[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]]
85/85 [=====] - 10s 80ms/step - loss: 0.0230
Epoch 2/50
85/85 [=====] - 6s 72ms/step - loss: 0.0097
Epoch 3/50
85/85 [=====] - 6s 74ms/step - loss: 0.0081
Epoch 4/50
85/85 [=====] - 7s 88ms/step - loss: 0.0069
Epoch 5/50
85/85 [=====] - 7s 77ms/step - loss: 0.0061
Epoch 6/50
85/85 [=====] - 6s 76ms/step - loss: 0.0058
Epoch 7/50
85/85 [=====] - 7s 85ms/step - loss: 0.0050
Epoch 8/50
85/85 [=====] - 7s 84ms/step - loss: 0.0051
Epoch 9/50
85/85 [=====] - 7s 83ms/step - loss: 0.0044
Epoch 10/50
85/85 [=====] - 8s 90ms/step - loss: 0.0040
Epoch 11/50
85/85 [=====] - 7s 79ms/step - loss: 0.0041
Epoch 12/50
85/85 [=====] - 7s 88ms/step - loss: 0.0037
Epoch 13/50
85/85 [=====] - 7s 78ms/step - loss: 0.0036
Epoch 14/50
85/85 [=====] - 7s 86ms/step - loss: 0.0034
Epoch 15/50
85/85 [=====] - 8s 92ms/step - loss: 0.0031
Epoch 16/50
85/85 [=====] - 7s 82ms/step - loss: 0.0032
Epoch 17/50
85/85 [=====] - 7s 84ms/step - loss: 0.0028
Epoch 18/50
85/85 [=====] - 7s 86ms/step - loss: 0.0030
Epoch 19/50
85/85 [=====] - 7s 82ms/step - loss: 0.0027
Epoch 20/50
85/85 [=====] - 7s 80ms/step - loss: 0.0027

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Epoch 21/50
85/85 [=====] - 7s 84ms/step - loss: 0.0025
Epoch 22/50
85/85 [=====] - 7s 85ms/step - loss: 0.0025
Epoch 23/50
85/85 [=====] - 8s 90ms/step - loss: 0.0025
Epoch 24/50
85/85 [=====] - 8s 96ms/step - loss: 0.0024
Epoch 25/50
85/85 [=====] - 8s 92ms/step - loss: 0.0023
Epoch 26/50
85/85 [=====] - 8s 95ms/step - loss: 0.0023
Epoch 27/50
85/85 [=====] - 7s 85ms/step - loss: 0.0022
Epoch 28/50
85/85 [=====] - 11s 129ms/step - loss: 0.0020
Epoch 29/50
85/85 [=====] - 10s 121ms/step - loss: 0.0022
Epoch 30/50
85/85 [=====] - 11s 124ms/step - loss: 0.0021
Epoch 31/50
85/85 [=====] - 9s 106ms/step - loss: 0.0020
Epoch 32/50
85/85 [=====] - 9s 106ms/step - loss: 0.0019
Epoch 33/50
85/85 [=====] - 9s 105ms/step - loss: 0.0020
Epoch 34/50
85/85 [=====] - 8s 89ms/step - loss: 0.0020
Epoch 35/50
85/85 [=====] - 8s 89ms/step - loss: 0.0019
Epoch 36/50
85/85 [=====] - 7s 88ms/step - loss: 0.0018
Epoch 37/50
85/85 [=====] - 7s 81ms/step - loss: 0.0019
Epoch 38/50
85/85 [=====] - 7s 85ms/step - loss: 0.0019
Epoch 39/50
85/85 [=====] - 7s 83ms/step - loss: 0.0017
Epoch 40/50
85/85 [=====] - 7s 87ms/step - loss: 0.0018
Epoch 41/50
85/85 [=====] - 7s 84ms/step - loss: 0.0018
Epoch 42/50
85/85 [=====] - 7s 85ms/step - loss: 0.0016
Epoch 43/50
85/85 [=====] - 7s 85ms/step - loss: 0.0017
Epoch 44/50
85/85 [=====] - 9s 108ms/step - loss: 0.0017

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Epoch 45/50
85/85 [=====] - 10s 117ms/step - loss: 0.0017
Epoch 46/50
85/85 [=====] - 8s 95ms/step - loss: 0.0016
Epoch 47/50
85/85 [=====] - 9s 105ms/step - loss: 0.0017
Epoch 48/50
85/85 [=====] - 10s 117ms/step - loss: 0.0016
Epoch 49/50
85/85 [=====] - 9s 102ms/step - loss: 0.0015
Epoch 50/50
85/85 [=====] - 7s 85ms/step - loss: 0.0016

```

[10]: <keras.callbacks.History at 0x7f88038fc7d0>

```

[11]: # Now to get the test set ready in a similar way as the training set.
# The following has been done so forst 60 entires of test set have 60 previous
# values which is impossible to get unless we take the whole
# 'High' attribute data for processing
dataset_total = pd.concat((dataset["High"][:'2016'],dataset["High"]['2017':
]),axis=0)
inputs = dataset_total[len(dataset_total)-len(test_set) - 60:].values
inputs = inputs.reshape(-1,1)
inputs = sc.transform(inputs)

```

```

[12]: # Preparing X_test and predicting the prices
X_test = []
for i in range(60,311):
    X_test.append(inputs[i-60:i,0])
X_test = np.array(X_test)
X_test = np.reshape(X_test, (X_test.shape[0],X_test.shape[1],1))
predicted_stock_price = regressor.predict(X_test)
predicted_stock_price = sc.inverse_transform(predicted_stock_price)

```

```

2024-02-26 11:55:58.665160: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32

```

```

[[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]]
2024-02-26 11:55:58.665990: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32

```

```

[[[{{node gradients/split_grad/concat/split/split_dim}}]]]
2024-02-26 11:55:58.666648: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an

```

error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:55:58.763713: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:55:58.764429: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:55:58.765095: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:55:58.861469: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:55:58.862183: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:55:58.862791: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:55:58.975564: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:55:58.976447: I tensorflow/core/common_runtime/executor.cc:1197 [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an

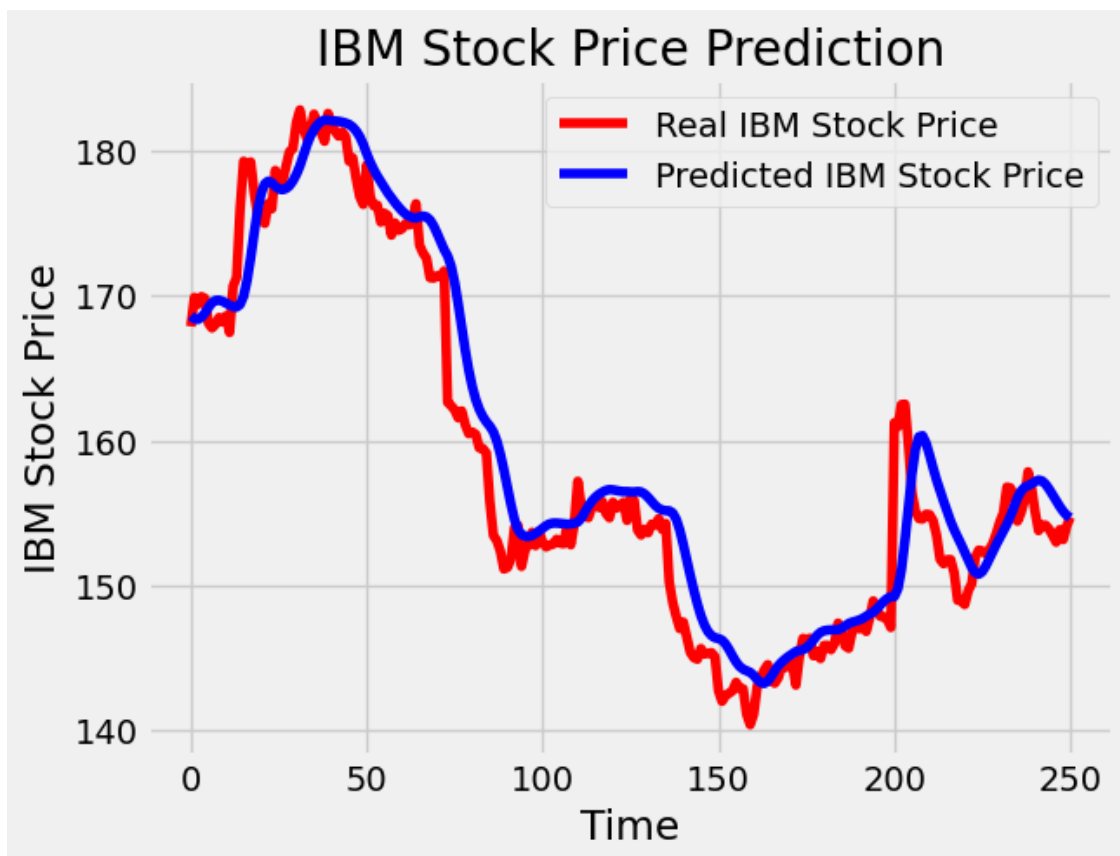
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

```
[[{{node gradients/split_grad/concat/split/split_dim}}]]  
2024-02-26 11:55:58.977094: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with  
dtype int32
```

```
[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
```

8/8 [=====] - 1s 23ms/step

```
[13]: # Visualizing the results for LSTM  
plot_predictions(test_set,predicted_stock_price)
```



```
[14]: # Evaluating our model  
return_rmse(test_set,predicted_stock_price)
```

The root mean squared error is 3.206352447486428.

```
[15]: # The GRU architecture
regressorGRU = Sequential()
# First GRU layer with Dropout regularisation
regressorGRU.add(GRU(units=50, return_sequences=True, input_shape=(X_train.
    ↪shape[1],1), activation='tanh'))
regressorGRU.add(Dropout(0.2))
# Second GRU layer
regressorGRU.add(GRU(units=50, return_sequences=True, input_shape=(X_train.
    ↪shape[1],1), activation='tanh'))
regressorGRU.add(Dropout(0.2))
# Third GRU layer
regressorGRU.add(GRU(units=50, return_sequences=True, input_shape=(X_train.
    ↪shape[1],1), activation='tanh'))
regressorGRU.add(Dropout(0.2))
# Fourth GRU layer
regressorGRU.add(GRU(units=50, activation='tanh'))
regressorGRU.add(Dropout(0.2))
# The output layer
regressorGRU.add(Dense(units=1))
# Compiling the RNN
regressorGRU.compile(optimizer=SGD(lr=0.01, decay=1e-7, momentum=0.9,
    ↪nesterov=False), loss='mean_squared_error')
# Fitting to the training set
regressorGRU.fit(X_train,y_train,epochs=50,batch_size=150)
```

2024-02-26 11:57:25.149384: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 11:57:25.149997: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 11:57:25.150547: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 11:57:25.223598: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with

```

dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:25.224135: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:25.224654: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:57:25.300121: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:25.300724: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:25.301251: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

Epoch 1/50

2024-02-26 11:57:25.379164: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:25.379754: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:25.380303: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an

```

error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

```
[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]  
/home/nmit/anaconda3/lib/python3.11/site-  
packages/keras/optimizers/legacy/gradient_descent.py:114: UserWarning: The `lr`  
argument is deprecated, use `learning_rate` instead.
```

```
super().__init__(name, **kwargs)  
2024-02-26 11:57:25.505644: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with  
dtype int32
```

```
[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]  
2024-02-26 11:57:25.506547: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype  
int32
```

```
[[{{node gradients/split_grad/concat/split/split_dim}}]]  
2024-02-26 11:57:25.507282: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with  
dtype int32
```

```
[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]  
2024-02-26 11:57:25.603053: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with  
dtype int32
```

```
[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]  
2024-02-26 11:57:25.603916: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype  
int32
```

```
[[{{node gradients/split_grad/concat/split/split_dim}}]]  
2024-02-26 11:57:25.604864: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with  
dtype int32
```

```
[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]  
2024-02-26 11:57:25.700811: I tensorflow/core/common_runtime/executor.cc:1197]  
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an  
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value  
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
```

```

dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:25.701808: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:25.702613: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:57:25.799332: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:25.800089: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:25.800768: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:57:26.485404: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:26.486328: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:26.487167: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with

```



```

dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:57:26.574665: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:26.575361: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:26.575973: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:57:26.664752: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:26.665529: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32
    [[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 11:57:26.666227: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
    [[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 11:57:26.759934: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32
    [[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 11:57:26.760780: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype

```

```

int32
[[[{{node gradients/split_grad/concat/split/split_dim}}]]]
2024-02-26 11:57:26.761440: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32
[[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]]
19/19 [=====] - 6s 132ms/step - loss: 0.1102
Epoch 2/50
19/19 [=====] - 3s 133ms/step - loss: 0.0467
Epoch 3/50
19/19 [=====] - 4s 211ms/step - loss: 0.0181
Epoch 4/50
19/19 [=====] - 4s 201ms/step - loss: 0.0051
Epoch 5/50
19/19 [=====] - 4s 190ms/step - loss: 0.0048
Epoch 6/50
19/19 [=====] - 3s 181ms/step - loss: 0.0041
Epoch 7/50
19/19 [=====] - 3s 173ms/step - loss: 0.0040
Epoch 8/50
19/19 [=====] - 4s 224ms/step - loss: 0.0037
Epoch 9/50
19/19 [=====] - 3s 163ms/step - loss: 0.0038
Epoch 10/50
19/19 [=====] - 3s 173ms/step - loss: 0.0035
Epoch 11/50
19/19 [=====] - 3s 149ms/step - loss: 0.0033
Epoch 12/50
19/19 [=====] - 3s 133ms/step - loss: 0.0033
Epoch 13/50
19/19 [=====] - 3s 133ms/step - loss: 0.0030
Epoch 14/50
19/19 [=====] - 3s 139ms/step - loss: 0.0031
Epoch 15/50
19/19 [=====] - 4s 186ms/step - loss: 0.0032
Epoch 16/50
19/19 [=====] - 3s 159ms/step - loss: 0.0029
Epoch 17/50
19/19 [=====] - 3s 143ms/step - loss: 0.0031
Epoch 18/50
19/19 [=====] - 3s 167ms/step - loss: 0.0028
Epoch 19/50
19/19 [=====] - 3s 142ms/step - loss: 0.0028
Epoch 20/50
19/19 [=====] - 4s 219ms/step - loss: 0.0029

```

Epoch 21/50
19/19 [=====] - 3s 177ms/step - loss: 0.0029
Epoch 22/50
19/19 [=====] - 4s 188ms/step - loss: 0.0027
Epoch 23/50
19/19 [=====] - 4s 189ms/step - loss: 0.0026
Epoch 24/50
19/19 [=====] - 3s 135ms/step - loss: 0.0027
Epoch 25/50
19/19 [=====] - 3s 153ms/step - loss: 0.0026
Epoch 26/50
19/19 [=====] - 3s 138ms/step - loss: 0.0026
Epoch 27/50
19/19 [=====] - 3s 151ms/step - loss: 0.0024
Epoch 28/50
19/19 [=====] - 3s 151ms/step - loss: 0.0027
Epoch 29/50
19/19 [=====] - 3s 139ms/step - loss: 0.0024
Epoch 30/50
19/19 [=====] - 3s 153ms/step - loss: 0.0025
Epoch 31/50
19/19 [=====] - 3s 145ms/step - loss: 0.0024
Epoch 32/50
19/19 [=====] - 3s 141ms/step - loss: 0.0023
Epoch 33/50
19/19 [=====] - 3s 149ms/step - loss: 0.0024
Epoch 34/50
19/19 [=====] - 3s 146ms/step - loss: 0.0024
Epoch 35/50
19/19 [=====] - 3s 147ms/step - loss: 0.0023
Epoch 36/50
19/19 [=====] - 3s 164ms/step - loss: 0.0022
Epoch 37/50
19/19 [=====] - 3s 180ms/step - loss: 0.0024
Epoch 38/50
19/19 [=====] - 4s 214ms/step - loss: 0.0022
Epoch 39/50
19/19 [=====] - 4s 214ms/step - loss: 0.0023
Epoch 40/50
19/19 [=====] - 4s 234ms/step - loss: 0.0023
Epoch 41/50
19/19 [=====] - 3s 165ms/step - loss: 0.0027
Epoch 42/50
19/19 [=====] - 3s 151ms/step - loss: 0.0021
Epoch 43/50
19/19 [=====] - 3s 158ms/step - loss: 0.0022
Epoch 44/50
19/19 [=====] - 3s 141ms/step - loss: 0.0021

```

Epoch 45/50
19/19 [=====] - 3s 162ms/step - loss: 0.0022
Epoch 46/50
19/19 [=====] - 3s 150ms/step - loss: 0.0021
Epoch 47/50
19/19 [=====] - 3s 150ms/step - loss: 0.0020
Epoch 48/50
19/19 [=====] - 3s 151ms/step - loss: 0.0022
Epoch 49/50
19/19 [=====] - 3s 174ms/step - loss: 0.0021
Epoch 50/50
19/19 [=====] - 3s 142ms/step - loss: 0.0020

```

[15]: <keras.callbacks.History at 0x7f87d8e09010>

```

[16]: # Preparing X_test and predicting the prices
X_test = []
for i in range(60,311):
    X_test.append(inputs[i-60:i,0])
X_test = np.array(X_test)
X_test = np.reshape(X_test, (X_test.shape[0],X_test.shape[1],1))
GRU_predicted_stock_price = regressorGRU.predict(X_test)
GRU_predicted_stock_price = sc.inverse_transform(GRU_predicted_stock_price)

```

```

2024-02-26 12:32:09.378406: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32

```

```

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]
2024-02-26 12:32:09.379353: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype
int32

```

```

[[{{node gradients/split_grad/concat/split/split_dim}}]]
2024-02-26 12:32:09.380007: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with
dtype int32

```

```

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]
2024-02-26 12:32:09.463215: I tensorflow/core/common_runtime/executor.cc:1197]
[/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an
error and you can ignore this message): INVALID_ARGUMENT: You must feed a value
for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with
dtype int32

```

```

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

```

2024-02-26 12:32:09.463953: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 12:32:09.464572: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 12:32:09.553253: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 12:32:09.554021: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 12:32:09.554660: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

2024-02-26 12:32:09.640028: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_2_grad/concat/split_2/split_dim' with dtype int32

[[{{node gradients/split_2_grad/concat/split_2/split_dim}}]]

2024-02-26 12:32:09.640928: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_grad/concat/split/split_dim' with dtype int32

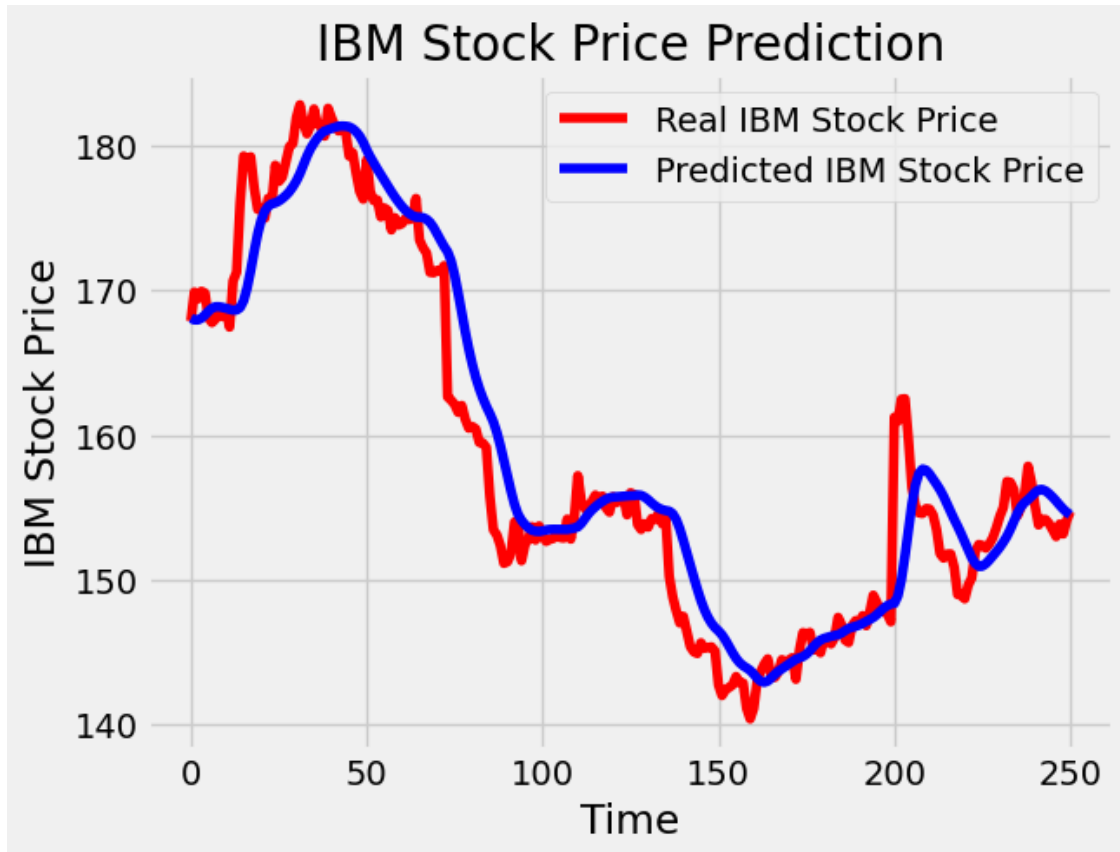
[[{{node gradients/split_grad/concat/split/split_dim}}]]

2024-02-26 12:32:09.641549: I tensorflow/core/common_runtime/executor.cc:1197] [/device:CPU:0] (DEBUG INFO) Executor start aborting (this does not indicate an error and you can ignore this message): INVALID_ARGUMENT: You must feed a value for placeholder tensor 'gradients/split_1_grad/concat/split_1/split_dim' with dtype int32

[[{{node gradients/split_1_grad/concat/split_1/split_dim}}]]

8/8 [=====] - 1s 36ms/step

```
[17]: # Visualizing the results for GRU
plot_predictions(test_set,GRU_predicted_stock_price)
```



```
[18]: # Evaluating GRU
return_rmse(test_set,GRU_predicted_stock_price)
```

The root mean squared error is 3.299945503557451.

```
[19]: # Sequence Generation
```

```
[20]: # Preparing sequence data
initial_sequence = X_train[2708,:]
sequence = []
for i in range(251):
    new_prediction = regressorGRU.predict(initial_sequence.
    ↪ reshape(initial_sequence.shape[1],initial_sequence.shape[0],1))
    initial_sequence = initial_sequence[1:]
    initial_sequence = np.append(initial_sequence,new_prediction,axis=0)
    sequence.append(new_prediction)
```

```
sequence = sc.inverse_transform(np.array(sequence).reshape(251,1))
```

```
1/1 [=====] - 0s 21ms/step
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1/1 [=====] - 0s 27ms/step
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```

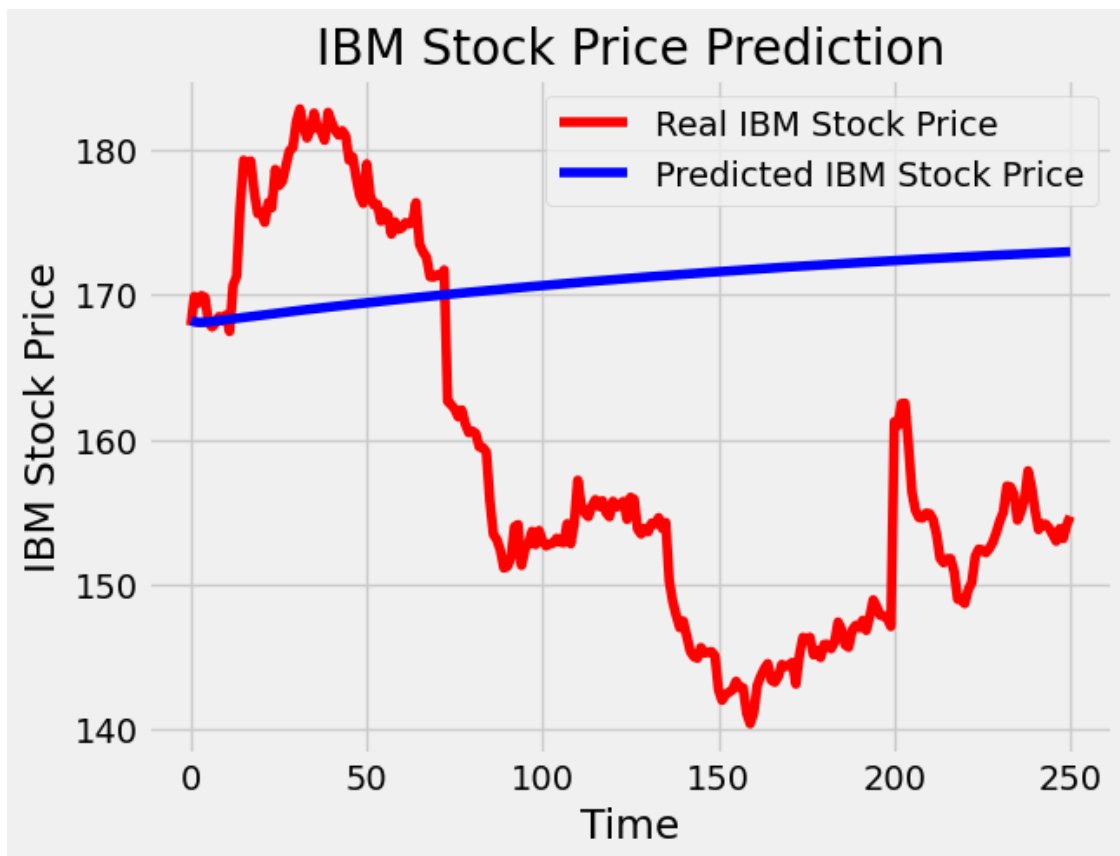
1/1 [=====] - 0s 49ms/step
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```

```

[21]: # Visualizing the sequence
      plot_predictions(test_set,sequence)

```



```

[22]: # Evaluating the sequence
      return_rmse(test_set,sequence)

```

The root mean squared error is 18.190643022532843.

[]: