

Evaluation

I make graphs for each model and calculate RMSE to evaluate model performance.

Import Packages

```
In [1]: import pickle
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from tensorflow.keras.models import Sequential, load_model
from train_test import train_test
from GRU_model import GRU_model
from actual_pred_plot import actual_pred_plot
```

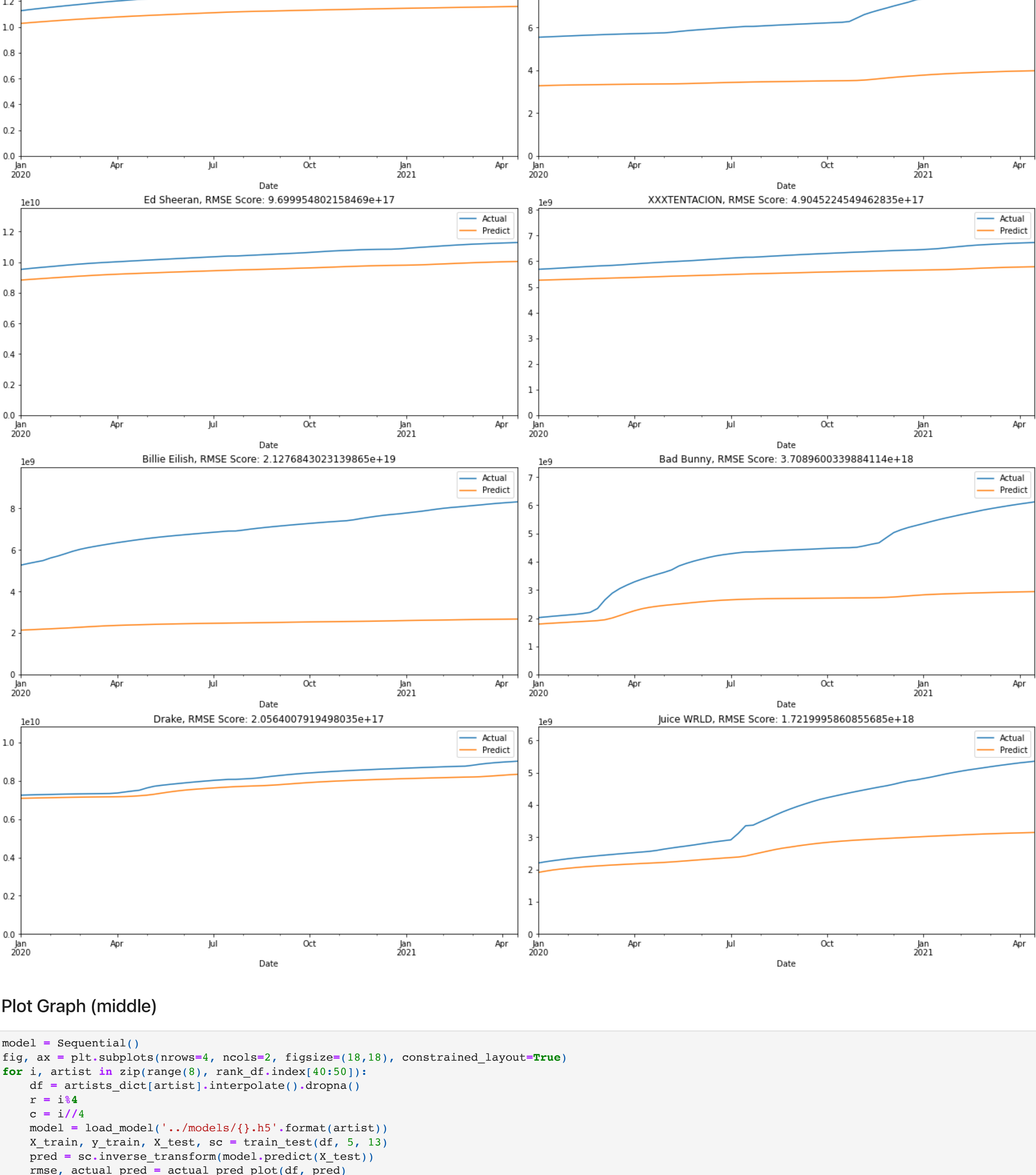
Load Data

```
In [2]: with open(
'../data/final/artists_dict.pickle', 'rb') as artists, open(
'../data/final/rank_df.pickle', 'rb') as rank:
    artists_dict = pickle.load(artists)
    rank_df = pickle.load(rank)
    artists.close()
    rank.close()
```

Plot Graph (head)

```
In [3]: model = Sequential()
fig, ax = plt.subplots(nrows=4, ncols=2, figsize=(10,18), constrained_layout=True)
for i, artist in zip(range(8), rank_df.index[:8]):
    df = artists_dict[artist].interpolate().dropna()
    r = i//4
    c = i//4
    model = load_model('../models/{}.h5'.format(artist))
    X_train, y_train, X_test, sc = train_test(df, 5, 13)
    pred = sc.inverse_transform(model.predict(X_test))
    rmse, actual_pred = actual_pred_plot(df, pred)
    actual_pred_plot(ax=ax[r][c], title='{} , RMSE Score: {}'.format(artist, round(rmse, 0)), ylim=(0, actual_pred['Actual'].max()*1.2));
    led.

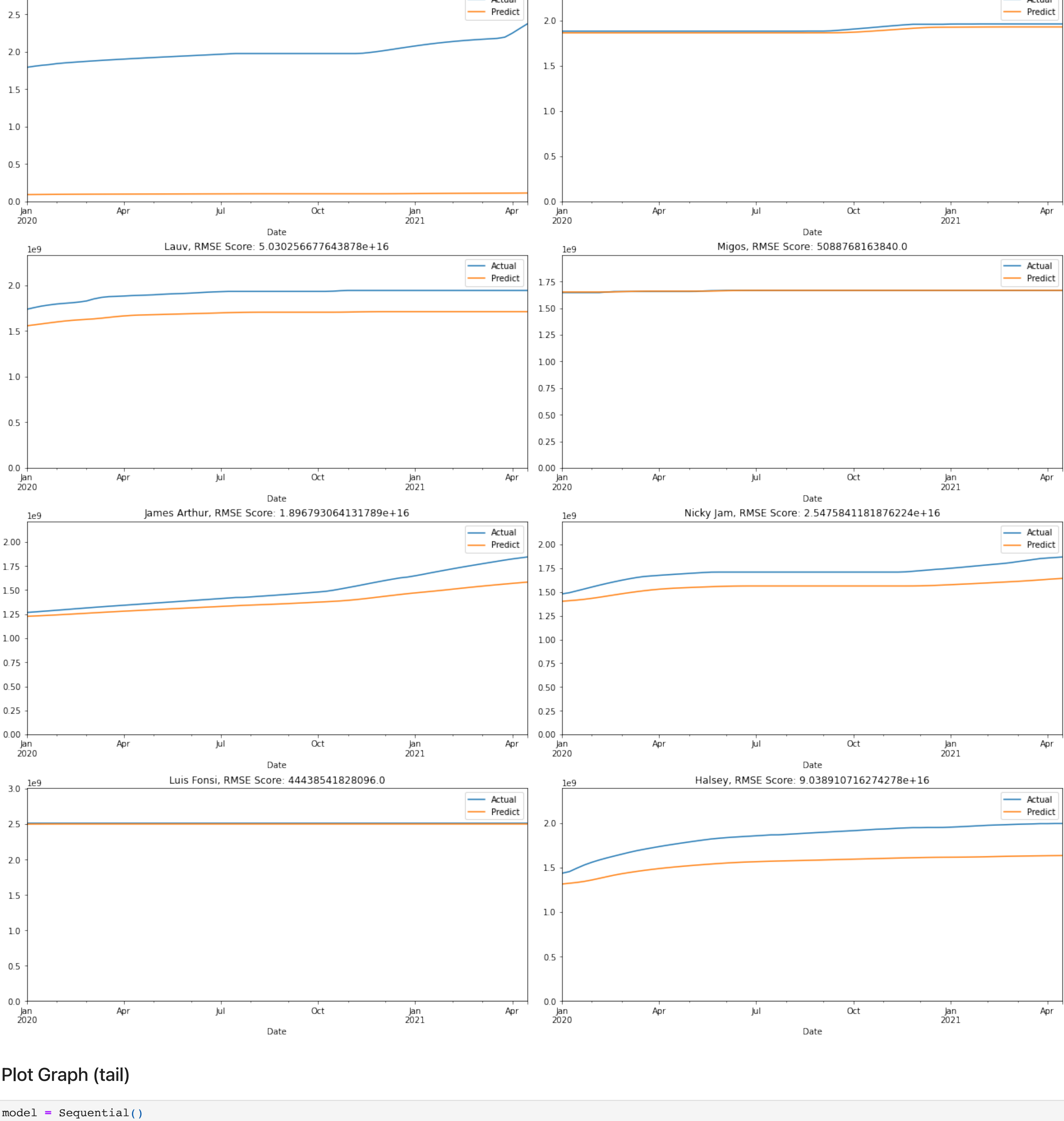
2022-06-02 14:07:50.411541: I tensorflow/core/common_runtime/pluggable_device/pluggable_device_factory.cc:305] Could not identify NVDIA node of platfor
m GPU ID 0, defaulting to 0. Your kernel may not have been built with NVDIA support.
2022-06-02 14:07:50.411653: I tensorflow/core/common_runtime/pluggable_device/pluggable_device_factory.cc:271] Created TensorFlow device (/job:localho
st/repllica:0/task:0/device:GPU:0 with 0 MB memory) -> physical PluggableDevice (device: 0, name: METAL, pci bus id: <undefined>)
Metal device set to: Apple M1
2022-06-02 14:07:50.969333: W tensorflow/core/platform/profile_utils/cpu_utils.cc:128] Failed to get CPU frequency: 0 Hz
2022-06-02 14:07:51.158513: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:51.214214: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:51.248583: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:51.811369: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:51.863567: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:51.886015: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:52.334033: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:52.385829: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:52.407494: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:52.963804: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:53.014948: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:53.036058: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
WARNING:tensorflow:5 out of the last 13 calls to <function Model.make_predict_function.<locals>.predict_function at 0x156765310> triggered tf.function
retracing. Retracing is expensive and the excessive number of tracings could be due to (1) creating @tf.function repeatedly in a loop, (2) passing tenso
rs with different shapes, (3) passing python objects instead of tensors. For (1), please define your @tf.function outside of the loop. For (2), @tf.fun
ction has experimental_relax_shapes=True option that relaxes argument shapes that can avoid unnecessary retracing. For (3), please refer to https://w
ww.tensorflow.org/guide/function#controlling_retracing and https://www.tensorflow.org/api_docs/python/tf/function for more details.
2022-06-02 14:07:53.586359: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:53.637254: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:53.658284: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
WARNING:tensorflow:5 out of the last 13 calls to <function Model.make_predict_function.<locals>.predict_function at 0x1588c0ff70> triggered tf.function
retracing. Retracing is expensive and the excessive number of tracings could be due to (1) creating @tf.function repeatedly in a loop, (2) passing tenso
rs with different shapes, (3) passing python objects instead of tensors. For (1), please define your @tf.function outside of the loop. For (2), @tf.fun
ction has experimental_relax_shapes=True option that relaxes argument shapes that can avoid unnecessary retracing. For (3), please refer to https://w
ww.tensorflow.org/guide/function#controlling_retracing and https://www.tensorflow.org/api_docs/python/tf/function for more details.
2022-06-02 14:07:54.109628: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:54.161084: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:54.184062: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:54.743093: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:54.795237: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:54.817388: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:55.264640: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:55.317141: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:55.339928: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
```



Plot Graph (middle)

```
In [4]: model = Sequential()
fig, ax = plt.subplots(nrows=4, ncols=2, figsize=(10,18), constrained_layout=True)
for i, artist in zip(range(8), rank_df.index[40:50]):
    df = artists_dict[artist].interpolate().dropna()
    r = i//4
    c = i//4
    model = load_model('../models/{}.h5'.format(artist))
    X_train, y_train, X_test, sc = train_test(df, 5, 13)
    pred = sc.inverse_transform(model.predict(X_test))
    rmse, actual_pred = actual_pred_plot(df, pred)
    actual_pred_plot(ax=ax[r][c], title='{} , RMSE Score: {}'.format(artist, round(rmse, 0)), ylim=(0, actual_pred['Actual'].max()*1.2));
    led.

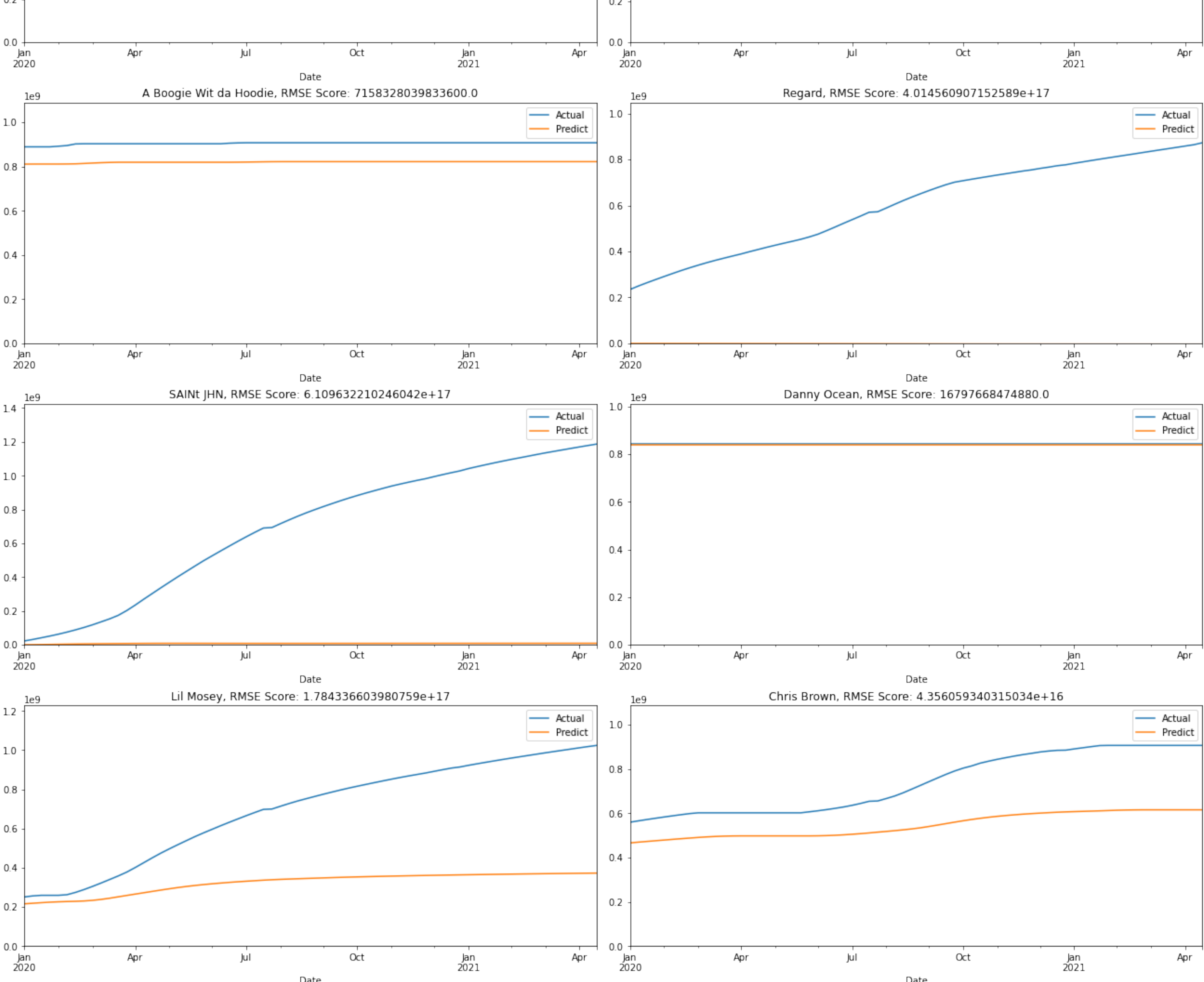
2022-06-02 14:07:56.341832: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:56.393788: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:56.416738: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:56.864187: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:56.915367: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:56.938247: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:57.482004: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:57.533520: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:57.556708: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:58.003583: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:58.044440: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:58.077351: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:58.634677: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:58.685692: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:58.709029: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:59.158268: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:59.217252: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:59.242283: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:59.866161: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:59.922980: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:07:59.955942: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:00.443303: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:00.497955: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:00.519903: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
```



Plot Graph (tail)

```
In [5]: model = Sequential()
fig, ax = plt.subplots(nrows=4, ncols=2, figsize=(10,18), constrained_layout=True)
for i, artist in zip(range(8), rank_df.index[-8]):
    df = artists_dict[artist].interpolate().dropna()
    r = i//4
    c = i//4
    model = load_model('../models/{}.h5'.format(artist))
    X_train, y_train, X_test, sc = train_test(df, 5, 13)
    pred = sc.inverse_transform(model.predict(X_test))
    rmse, actual_pred = actual_pred_plot(df, pred)
    actual_pred_plot(ax=ax[r][c], title='{} , RMSE Score: {}'.format(artist, round(rmse, 0)), ylim=(0, actual_pred['Actual'].max()*1.2));
    led.

2022-06-02 14:08:01.541613: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:01.592661: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:01.616877: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:02.165529: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:02.216954: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:02.241333: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:02.687516: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:02.740151: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:02.762705: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:03.312655: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:03.363959: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:03.387226: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:03.896724: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:03.913448: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:04.475155: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:04.539866: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:04.567019: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:05.037007: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:05.094396: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:05.118527: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:05.710304: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:05.763705: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
2022-06-02 14:08:05.786692: I tensorflow/core/grappler/optimizers/custom_graph_optimizer_registry.cc:113] Plugin optimizer for device_type GPU is enab
led.
```



In []: