Model Deployment- Plant Pathology

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- Reference- https://bsapubs.onlinelibrary.wiley.com/doi/10.1002/aps3.11390
- Reference- https://www.kaggle.com/competitions/plant-pathology-2020-fgvc7/code
- Reference- https://www.kaggle.com/code/rajesh2609/apple-foliar-diseases-extensive-analysis
- Reference- https://www.kaggle.com/code/ditarazdemir/plant-pathology-eda-deep-learning-models
- Reference- https://www.kaggle.com/code/xalebhoshmer/classification-foliar-diseases-in-apple-trees
- Reference- https://www.kaggle.com/code/nitinchoudhary012/apple-disease-classification
- Reference- https://www.kaggle.com/code/gerochai2/plant-pathology-classification-with-tensorflow
- Reference- https://medium.com/@dhirajkumarsahu.999/plant-disease-detection-926ca83b4aa8
- Reference- https://github.com/ElvictorS1/Plant-Pathology-2020---FGVC7-Identify-the-category-of-foliar-diseases-in-apple-trees/blob/master/Plant%20Pathology%202020%20_Image_Classifier.ipynb
- Reference- https://github.com/Julien96/Plant-Pathology-2020-FGVC7/tree/master/Jupyter%20Notebooks
- Reference- https://github.com/ResByte/plant-pathology-2020-fgvc7-pytorch
- Reference- https://github.com/somrewbleeashishi/Plant-Pathology-2020---FGVC7/blob/master/Plant_pathology.ipynb
- Reference- https://graphviz.gitlab.io/download/
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- Reference- https://pypi.org/project/pydot/
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- Reference- https://stackoverflow.com/questions/6444548/how-do-i-get-the-picture-size-with-pil
- Reference- https://stackoverflow.com/questions/54595551/what-is-this-error-attributeerror-numpy-ndarray-object-has-no-attribute-loa
- Reference- https://stackoverflow.com/questions/50906123/tensor-name-image-is-not-defined
- Reference- https://www.kaggle.com/competitions/plant-pathology-2020-fgvc7/submissions
- Reference- https://www.kaggle.com/code/phuc16102001/plant-pathology-2020-vgg-style
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- Reference- https://towardsdatascience.com/end-to-end-deep-learning-project-part-1-930af1e1e191
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- Reference- https://www.geeksforgeeks.org/vgg-16-cnn-model/
- Reference- https://medium.com/@mgreatlearning/everything-you-need-to-know-about-vgg16-731Sdefb59i9#:~:text=VGG16%20is%20object%20detection%20and.to%20use%20with%20transfer%20learning.
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- Reference- https://www.kaggle.com/code/ndhpro/plant-pathology-2020-efficientnet
- Reference- https://github.com/DhirajKumarSahu/Plant_Pathology_Challenge
- Reference- https://www.kaggle.com/competitions/plant-pathology-2020-fgvc7/submissions#
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- Reference- https://blog.finxter.com/how-to-show-images-in-python/
- Reference- https://stackoverflow.com/questions/74500526/streamlit-via-google-colab-through-localtunnel-does-not-work-anymore
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- Reference- https://freecodecamp.org/news/deploy-your-machine-learning-models-for-free/
- Reference- https://www.freecodecamp.org/news/deploy-ml-model-to-production-as-api/
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- Reference- https://devcenter.heroku.com/articles/git

```
In [ ]:  from google.colab import drive
         drive.mount('/content/drive/')
```

```
Mounted at /content/drive/
```

```
In [2]:  !pip -q install streamlit==1.13.0
         !pip -q install pyngrok
         # !pip -q install protobuf
         # !pip install fastapi uvicorn
```

```
|████████████████████████████████| 9.2 MB 14.7 MB/s
|████████████████████████████████| 78 kB 8.1 MB/s
|████████████████████████████████| 164 kB 95.0 MB/s
|████████████████████████████████| 4.7 MB 53.3 MB/s
|████████████████████████████████| 237 kB 66.7 MB/s
|████████████████████████████████| 182 kB 50.4 MB/s
|████████████████████████████████| 62 kB 1.3 MB/s
|████████████████████████████████| 51 kB 7.4 MB/s
Building wheel for validators (setup.py) ... done
|████████████████████████████████| 761 kB 14.3 MB/s
Building wheel for pyngrok (setup.py) ... done
```

```
In [3]:  import os
         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import cv2
         import plotly.express as px
         import plotly.graph_objects as go
         import tensorflow
         import keras
         from keras.utils import np_utils
         from keras.models import Model, Sequential
         from tensorflow.keras.preprocessing import image
         from keras.preprocessing.image import ImageDataGenerator
         from tensorflow.keras.callbacks import ModelCheckpoint,EarlyStopping
         from keras.layers import GlobalAveragePooling2D, Dropout, Dense,Activation
         from keras import optimizers
         from PIL import Image
         from tqdm import tqdm
         import plotly.figure_factory as ff
         from plotly.subplots import make_subplots
         from keras.applications.densenet import DenseNet121
         tqdm.pandas()
         import datetime as dt
         from pyngrok import ngrok
         import streamlit as st
```

```
In [4]:  %%writefile app.py

         import os
         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import cv2
         import plotly.express as px
         import plotly.graph_objects as go
         import tensorflow
         import keras
         from keras.utils import np_utils
         from keras.models import Model, Sequential
         from keras.layers import GlobalAveragePooling2D, Dropout, Dense,Activation
         from tensorflow.keras.callbacks import ModelCheckpoint,EarlyStopping
         from keras.preprocessing.image import ImageDataGenerator
         from keras import optimizers
         from PIL import Image
         from tensorflow.keras.preprocessing import image
         from tqdm import tqdm
         import plotly.figure_factory as ff
         from plotly.subplots import make_subplots
         from keras.applications.densenet import DenseNet121
         from sklearn.metrics import roc_auc_score
         tqdm.pandas()
         from pyngrok import ngrok
         import streamlit as st
         import datetime as dt

         file_upload= st.file_uploader("Select a file")
         if file_upload is not None:
             st.subheader('Plant Disease Prediction:')
             query_1 = pd.read_csv(file_upload)

             batches = 16
             datagen = ImageDataGenerator(
                 rotation_range=10, # rotating the image
                 width_shift_range=0.2, # horizontally shifting the image
                 height_shift_range=0.2, # vertically shifting the image
                 zoom_range=0.2, # zooming the image
                 horizontal_flip=True, # horizontally fliping the image
                 brightness_range=[0.2,1.2]) # brightening the image

             test_datagen = datagen.flow_from_dataframe(dataframe= query_1,
                                                        directory='/content/drive/MyDrive/Self_Case_Study_2/plant-pathology-2020-fgvc7/images/',
                                                        x_col="image_id",
                                                        y_col=None,
                                                        class_mode=None,
                                                        shuffle=False,
                                                        batch_size=batches,
                                                        target_size=(100,100)
                                                        )

             def roc_auc(y_true, y_prediction):
                 try:
                     roc_auc_score(y_true, y_prediction)
                 except ValueError:
                     return 0.5
                 return roc_auc_score(y_true, y_prediction)

             def auc_score( y_true, y_prediction ) :
                 score_auc = tensorflow.py_function(roc_auc,[y_true, y_prediction],'float32',name='sklearnAUC')
                 return score_auc

             pre_dense_model = DenseNet121(include_top=False, weights='imagenet', input_shape=(100,100,3))
             dense_model = tensorflow.keras.Sequential([pre_dense_model,
                                                        tensorflow.keras.layers.GlobalAveragePooling2D(),
                                                        tensorflow.keras.layers.Dropout(0.3),
                                                        tensorflow.keras.layers.Dense(4, activation='softmax')])
             dense_model.load_weights('/content/drive/My Drive/Self_Case_Study_2/plant-pathology-2020-fgvc7/dense_model.hdf5')

             prediction = dense_model.predict(test_datagen, verbose=1)

             file_id = query_1.image_id

             for i in file_id:
                 image_read = cv2.imread("/content/drive/MyDrive/Self_Case_Study_2/plant-pathology-2020-fgvc7/images/"+i)
                 resize_image = cv2.resize(image_read,(256,256))

             filename = "/content/drive/MyDrive/Self_Case_Study_2/plant-pathology-2020-fgvc7/sample_submission.csv"
             submit = pd.read_csv(filename)
             file = submit.iloc[:1]
             file.loc[:, 'healthy':] = prediction

             st.subheader('Predicted leaf disease with probabilities:')
             st.write(file)
             st.image(resize_image)
```

```
Writing app.py
```

```
In [5]:  !ngrok authtoken 2ISBpeR1yVchTvoZUEAUd1BpMUi_5H6ihPvbuGWjd5DhhNB1p
```

```
Authtoken saved to configuration file: /root/.ngrok2/ngrok.yml
```

```
In [ ]:  public_url = ngrok.connect(port='80')
         print (public_url)
         !streamlit run --server.port 80 app.py >/dev/null
```

```
INFO:pyngrok.ngrok:Opening tunnel named: http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="no configuration paths supplied"
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="no configuration paths supplied"
2022-12-22 09:59:35.653 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:35+0000 lvl=info msg="no configuration paths supplied"
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="using configuration at default config path" path=/root/.ngrok2/ngrok.yml
2022-12-22 09:59:35.664 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:35+0000 lvl=info msg="using configuration at default config path" path=/root/.ngrok2/ngrok.yml
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="open config file" path=/root/.ngrok2/ngrok.yml err=nil
2022-12-22 09:59:35.667 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:35+0000 lvl=info msg="open config file" path=/root/.ngrok2/ngrok.yml err=nil
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="starting web service" obj=web addr=127.0.0.1:4040
2022-12-22 09:59:35.670 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:35+0000 lvl=info msg="starting web service" obj=web addr=127.0.0.1:4040
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="tunnel session started" obj=tunnels.session
2022-12-22 09:59:35.802 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:35+0000 lvl=info msg="tunnel session started" obj=tunnels.session
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:35+0000 lvl=info msg="client session established" obj=csess id=bcdde7ca11d8
2022-12-22 09:59:36.001 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg="client session established" obj=csess id=bcdde7ca11d8
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels id=d1be3f951e8e3047
2022-12-22 09:59:36.033 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels id=d1be3f951e8e3047
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=end pg=/api/tunnels id=d1be3f951e8e3047 status=200 dur=371.904µs
2022-12-22 09:59:36.048 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=end pg=/api/tunnels id=d1be3f951e8e3047 status=200 dur=371.940µs
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels id=9d7c04317ec96fac
2022-12-22 09:59:36.057 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels id=9d7c04317ec96fac
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=end pg=/api/tunnels id=9d7c04317ec96fac status=200 dur=161.86µs
2022-12-22 09:59:36.074 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=end pg=/api/tunnels id=9d7c04317ec96fac status=200 dur=161.88µs
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels id=fac0627c1adfea37
2022-12-22 09:59:36.086 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels id=fac0627c1adfea37
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg="started tunnel" obj=tunnels name="http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa (http)" addr=http://localhost:80 url=http://1504-34-91-78-247.ngrok.io
2022-12-22 09:59:36.253 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg="started tunnel" obj=tunnels name="http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa (http)" addr=http://localhost:80 url=http://1504-34-91-78-247.ngrok.io
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg="started tunnel" obj=tunnels name=http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa addr=http://localhost:80 url=https://1504-34-91-78-247.ngrok.io
2022-12-22 09:59:36.283 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg="started tunnel" obj=tunnels name=http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa addr=http://localhost:80 url=https://1504-34-91-78-247.ngrok.io
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=end pg=/api/tunnels id=fac0627c1adfea37 status=201 dur=218.716463ms
2022-12-22 09:59:36.289 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=end pg=/api/tunnels id=fac0627c1adfea37 status=201 dur=218.716463ms
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=start pg=/api/tunnels/http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa (http)" id=5dbe11f87d577d04
2022-12-22 09:59:36.295 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=start pg="/api/tunnels/http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa (http)" id=5dbe11f87d577d04
INFO:pyngrok.process.ngrok:t=2022-12-22T09:59:36+0000 lvl=info msg=end pg="/api/tunnels/http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa (http)" id=5dbe11f87d577d04 status=200 dur=197.203µs
2022-12-22 09:59:36.297 INFO    pyngrok.process.ngrok: t=2022-12-22T09:59:36+0000 lvl=info msg=end pg="/api/tunnels/http-80-52b389f6-43cb-4d64-a248-960d9d1c11aa (http)" id=5dbe11f87d577d04 status=200 dur=197.203µs
NgrokTunnel: "http://1504-34-91-78-247.ngrok.io" -> "http://localhost:80"
2022-12-22 09:59:37.065 INFO    numexpr.utils: NumExpr defaulting to 2 threads.
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:42+0000 lvl=warn msg="failed to open private leg" id=59a27526a830 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:42.827 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:42+0000 lvl=warn msg="failed to open private leg" id=59a27526a830 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:43+0000 lvl=warn msg="failed to open private leg" id=6b7b979b228e privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:43.305 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:43+0000 lvl=warn msg="failed to open private leg" id=6b7b979b228e privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:45+0000 lvl=warn msg="failed to open private leg" id=f68dbc2c0d7d privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:45.443 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:45+0000 lvl=warn msg="failed to open private leg" id=f68dbc2c0d7d privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:45+0000 lvl=warn msg="failed to open private leg" id=74b6ef79d902 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:45.915 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:45+0000 lvl=warn msg="failed to open private leg" id=74b6ef79d902 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:46+0000 lvl=warn msg="failed to open private leg" id=6f2c71017f31 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:46.863 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:46+0000 lvl=warn msg="failed to open private leg" id=6f2c71017f31 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:47+0000 lvl=warn msg="failed to open private leg" id=f97ef885242c privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:47.427 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:47+0000 lvl=warn msg="failed to open private leg" id=f97ef885242c privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:48+0000 lvl=warn msg="failed to open private leg" id=bfd5f6afb208 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:48.192 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:48+0000 lvl=warn msg="failed to open private leg" id=bfd5f6afb208 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:48+0000 lvl=warn msg="failed to open private leg" id=8ad22cb37627 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:48.661 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:48+0000 lvl=warn msg="failed to open private leg" id=8ad22cb37627 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:52+0000 lvl=warn msg="failed to open private leg" id=7b05ac2e4f5c privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:52.478 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:52+0000 lvl=warn msg="failed to open private leg" id=7b05ac2e4f5c privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:52+0000 lvl=warn msg="failed to open private leg" id=4172eceda79 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:52.953 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:52+0000 lvl=warn msg="failed to open private leg" id=4172eceda79 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:55+0000 lvl=warn msg="failed to open private leg" id=851e17f5e0d privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:55.332 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:55+0000 lvl=warn msg="failed to open private leg" id=851e17f5e0d privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:55+0000 lvl=warn msg="failed to open private leg" id=3bf960988083 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:55.836 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:55+0000 lvl=warn msg="failed to open private leg" id=3bf960988083 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
WARNING:pyngrok.process.ngrok:t=2022-12-22T09:59:56+0000 lvl=warn msg="failed to open private leg" id=f1b93313d3 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
2022-12-22 09:59:56.545 WARNING pyngrok.process.ngrok: t=2022-12-22T09:59:56+0000 lvl=warn msg="failed to open private leg" id=f1b93313d3 privaddr=localhost:80 err="dial tcp 127.0.0.1:80: connect: connection refused"
INFO:pyngrok.process.ngrok:t=2022-12-22T10:00:02+0000 lvl=info msg="join connections" obj=join id=959c832ef2444 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37608
2022-12-22 10:00:02.972 INFO    pyngrok.process.ngrok: t=2022-12-22T10:00:02+0000 lvl=info msg="join connections" obj=join id=959c832ef2444 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37608
INFO:pyngrok.process.ngrok:t=2022-12-22T10:01:03+0000 lvl=info msg="join connections" obj=join id=8f75890e1981 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37666
2022-12-22 10:01:03.450 INFO    pyngrok.process.ngrok: t=2022-12-22T10:01:03+0000 lvl=info msg="join connections" obj=join id=8f75890e1981 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37666
INFO:pyngrok.process.ngrok:t=2022-12-22T10:03:00+0000 lvl=info msg="join connections" obj=join id=9d56d8fad61 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37704
2022-12-22 10:03:00.688 INFO    pyngrok.process.ngrok: t=2022-12-22T10:03:00+0000 lvl=info msg="join connections" obj=join id=9d56d8fad61 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37704
INFO:pyngrok.process.ngrok:t=2022-12-22T10:03:00+0000 lvl=info msg="join connections" obj=join id=81c8e74297c l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37738
2022-12-22 10:03:00.785 INFO    pyngrok.process.ngrok: t=2022-12-22T10:03:00+0000 lvl=info msg="join connections" obj=join id=81c8e74297c l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37738
INFO:pyngrok.process.ngrok:t=2022-12-22T10:03:01+0000 lvl=info msg="join connections" obj=join id=d38f3c116246 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37802
2022-12-22 10:00:03.702 INFO    pyngrok.process.ngrok: t=2022-12-22T10:03:03+0000 lvl=info msg="join connections" obj=join id=d38f3c116246 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37802
INFO:pyngrok.process.ngrok:t=2022-12-22T10:03:09+0000 lvl=info msg="join connections" obj=join id=9a665b0ae8ba2 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37906
2022-12-22 10:00:09.722 INFO    pyngrok.process.ngrok: t=2022-12-22T10:03:09+0000 lvl=info msg="join connections" obj=join id=9a665b0ae8ba2 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37906
INFO:pyngrok.process.ngrok:t=2022-12-22T10:07+0000 lvl=info msg="join connections" obj=join id=32b1b4074870 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:41310
2022-12-22 10:00:07.334 INFO    pyngrok.process.ngrok: t=2022-12-22T10:07+0000 lvl=info msg="join connections" obj=join id=32b1b4074870 l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:41310
2022-12-22 10:00:07.334 INFO    tensorflow/stream_executor/cuda/cuda_driver.cc:271] failed call to cuInit: CUDA_ERROR_NO_DEVICE: no CUDA-capable device is detected
INFO:pyngrok.process.ngrok:t=2022-12-22T10:00:27+0000 lvl=info msg="join connections" obj=join id=934d309d7ace l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:41318
2022-12-22 10:00:27.182 INFO    pyngrok.process.ngrok: t=2022-12-22T10:00:27+0000 lvl=info msg="join connections" obj=join id=934d309d7ace l=127.0.0.1:80 r=[2406:7400:61:dbd7:4292:e0e6:4cb2:f4a5]:37696
```

- I have deployed the best model on test data.
- Here is the deployment video- https://drive.google.com/file/d/1SAGVkx-3JGyd2D29jqBLPTakircC2szZ/view?usp=sharing
- Kindly go through the file(s) and suggest for improvements, if any.

```
In [ ]:
```