Mount Drive

```
from google.colab import drive
drive.mount('/content/drive'
    Mounted at /content/drive
```

zip_ref.extractall('tmp/rps-test')

zip_ref.close()

▼ Prepare the Dataset

```
Import library
#!pip install tensorflowjs
                         Looking in indexes: <a href="https://pypi.org/simple">https://us</a>
                       Collecting tensorflowjs
                                 Downloading tensorflowjs-3.18.0-py3-none-any.whl (77 kB)
                                                                                                                                                                                                         77 kB 6.0 MB/
                         Collecting packaging~=20.9
                                Downloading packaging-20.9-py2.py3-none-any.whl (40 kB)
|| 40 kB 7.2 MB/s
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Requirement already satisfied: tensorflow3,>=2.1.0 in /usr/local/lib/python3.7/dist-packages (from tensorflowjs) (2.8.0+zzzcolab20220506162203)
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Downloading tf-estimator-nightly==2.8.0.dev2021122109
Downloading tf-estimator-nightly==2.8.0.dev2021122109
Poy2.py3-none-any.whl (462 kB)
                          Requirement already satisfied:
                       Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (4.2.0) Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflow Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (1.6.3)
                       Requirement already satisfied: protobuf>=3.9.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (3.17.3) Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (3.3.0 Requirement already satisfied: flatbuffers>=1.12 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (2.0)
                       Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (3.1.0)
Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.7/dist-packages (from tensorflow<3,>=2.1.0->tensorflowjs) (1.14.1)
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                     Requirement already satisfied: gast>=0.2.1 in /usr/local/lib/python3.7/dist-packages (from tensorflow3,>=2.1.0->tensorflowjs) (2.8.0)

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Requirement already satisfied: mproioc2.0,>=1.24.3 in /usr/local/lib/python3.7/dist-packages (from tensorflowc3,>=2.1.0->tensorflowjs) (1.21.6)

Requirement already satisfied: mhcelc1.0,>=0.23.0 in /usr/local/lib/python3.7/dist-packages (from tensorflowc3,>=2.1.0->tensorflowjs) (1.46.1)

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Requirement already satisfied: tensorboard-data-serverc0.7.0,>=0.6.0 in /usr/local/lib/python3.7/dist-packages (from tensorboardc2.9,>=2.8->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorflowc3,>=2.1.0->tensorf
                       Requirement already satisfied: importlib-metadata>=4.4 in /usr/local/lib/python3.7/dist-packages (from markdown>=2.6.8->tensorboard<2.9,>=2.8->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<3,>=2.1.0->tensorflow<
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                                Attempting uninstall: packaging
Found existing installation: packaging 21.3
Uninstalling packaging-21.3:
                                                    Successfully uninstalled packaging-21.3
                       ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the source of the following dependency conflicts. datascience 0.10.6 requires folium=0.2.1, but you have folium 0.8.3 which is incompatible.

Successfully installed packaging-2.0.9 tensorflowjs-3.18.0 tf-estimator-nightly-2.8.0.dev2021122109

WARNING: The following packages were previously imported in this runtime:
                                 [packaging]
                          You must restart the runtime in order to use newly installed versions
                              RESTART RUNTIME
 import tensorflow as ti
 import subprocess
 Copy dataset from drive
cp -R /content/drive/MyDrive/indo_food_datasets/jadi/food-dataset-500 /content/
 Unzip file
import zipfile
 # Extract the archive
local_zip = './food-dataset-500.zip'
zip_ref = zipfile.ZipFile(local_zip, 'r')
 zip_ref.extractall('tmp/food-dataset')
zip_ref.close()
# local_zip = './rps-test-set.zip'
# zip_ref = zipfile.ZipFile(local_zip, 'r')
```

```
Delete unused dataset
```

```
food_classes = ['soto','pepes']
for food_class in food_classes:
subprocess.run(["rm", "-rf", "/content/food-dataset-500/test/"+food_class])
subprocess.run(["rm", "-rf", "/content/food-dataset-500/train/"+food_class])
```

Model

```
Build Model Layer
```

```
model = tf.keras.models.Sequential([
    \# Note the input shape is the desired size of the image 150x150 with 3 bytes color \# This is the first convolution
    \label{thm:conv2D(32, (3,3), activation='relu', input\_shape=(150, 150, 3)), tf.keras.layers.MaxPooling2D(), }
     # The second convolution
     tf.keras.layers.Conv2D(32, (3,3), activation='relu'),
     tf.keras.layers.MaxPooling2D(),
     # The third convolution
     tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
     {\sf tf.keras.layers.MaxPooling2D(),}
     # The fourth convolution
    # tf.keras.layers.Conv2D(64, (3,3), activation='relu'),
# tf.keras.layers.MaxPooling2D(2,2),
    # Flatten the results to feed into a DNN
tf.keras.layers.Flatten(),
    #tf.keras.layers.Dropout(0.5),
# 512 neuron hidden layer
     tf.keras.layers.Dense(128, activation='relu'),
tf.keras.layers.Dense(8, activation='softmax')
# Print the model summary
model.summary()
```

| Model: | "sequential" |
|--------|--------------|
| | |

| Layer (type) | Output Shape | Param # |
|--|----------------------|---------|
| conv2d (Conv2D) | (None, 148, 148, 32) | 896 |
| <pre>max_pooling2d (MaxPooling2D)</pre> | (None, 74, 74, 32) | 0 |
| conv2d_1 (Conv2D) | (None, 72, 72, 32) | 9248 |
| max_pooling2d_1 (MaxPooling 2D) | (None, 36, 36, 32) | 0 |
| conv2d_2 (Conv2D) | (None, 34, 34, 64) | 18496 |
| max_pooling2d_2 (MaxPooling 2D) | (None, 17, 17, 64) | 0 |
| flatten (Flatten) | (None, 18496) | 0 |
| dense (Dense) | (None, 128) | 2367616 |
| dense_1 (Dense) | (None, 8) | 1032 |
| otal params: 2,397,288 Trainable params: 2,397,288 Ion-trainable params: 0 | | |

Compile Model

```
# Set the training parameters
model.compile(loss = 'categorical_crossentropy', optimizer='adam', metrics=['accuracy'])
```

▼ Prepare the ImageDataGenerator

```
from keras_preprocessing.image import ImageDataGenerator
TRAINING_DIR = "/content/food-dataset-500/train"
training_datagen = ImageDataGenerator(
rescale = 1./255,
      rotation_range=40,
width_shift_range=0.2,
      height_shift_range=0.2,
      shear_range=0.2,
      zoom_range=0.2,
      horizontal flip=True
      fill_mode='nearest')
VALIDATION_DIR = "/content/food-dataset-500/test"
validation_datagen = ImageDataGenerator(rescale = 1./255)
train_generator = training_datagen.flow_from_directory(
    TRAINING_DIR,
    target_size=(150,150)
    class_mode='categorical',
  batch_size=126
validation_generator = validation_datagen.flow_from_directory(
    VALIDATION_DIR,
    target_size=(150,150),
class_mode='categorical',
  batch_size=126
```

```
#batch_size=126
)

Found 3327 images belonging to 8 classes.
Found 800 images halonging to 8 classes.
```

Train the model and evaluate the results

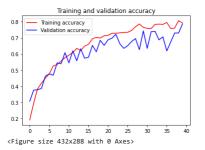
plt.plot(epochs, acc, 'r', label='Training accuracy')

```
Define Callback
class myCallback(tf.keras.callbacks.Callback):
 def on_epoch_end(self, epoch, logs={}):
   Halts the training after reaching 60 percent accuracy
   Args:
     epoch (integer) - index of epoch (required but unused in the function definition below)
   logs (dict) - metric results from the training epoch
   # Check accuracy
   # if(logs.get('loss') < 0.4):
       # Stop if threshold is met
print("\nLoss is lower than 0.4 so cancelling training!")
       self.model.stop_training = True
   if(logs.get('val_accuracy') > 0.75 and logs.get('accuracy') > 0.75):
     # Stop if threshold is met
     print("\nVal_accuracy is higher than 0.8 so cancelling training!")
     self.model.stop_training = True
# Instantiate class
callbacks = mvCallback()
Train Mode
history = model.fit(train_generator, epochs=100, validation_data = validation_generator, verbose = 1, validation_steps=3, callbacks=[callbacks])
    Epoch 13/100
27/27 [=====
Epoch 14/100
                              ========] - 19s 713ms/step - loss: 0.9979 - accuracy: 0.6351 - val_loss: 1.3147 - val_accuracy: 0.5582
     .
27/27 [=
                             :=======] - 19s 720ms/step - loss: 0.9994 - accuracy: 0.6210 - val_loss: 1.0515 - val_accuracy: 0.6323
    27/27 [=======
                           Epoch 16/100
27/27 [=====
                                ======] - 19s 709ms/step - loss: 0.9366 - accuracy: 0.6598 - val_loss: 1.1367 - val_accuracy: 0.5794
    Epoch 17/100
    27/27 [
                               =======] - 19s 709ms/step - loss: 0.8679 - accuracy: 0.6946 - val_loss: 0.9249 - val_accuracy: 0.6534
    Epoch 18/100
                                  =====| - 19s 699ms/step - loss: 0.8285 - accuracy: 0.7027 - val loss: 1.0982 - val accuracy: 0.6138
    27/27 [=
    Fnoch 19/100
     27/27
                                     :===] - 19s 698ms/step - loss: 0.8431 - accuracy: 0.6988 - val_loss: 0.8082 - val_accuracy: 0.6852
    Epoch 20/100
    27/27 [=
                             ========] - 19s 700ms/step - loss: 0.8016 - accuracy: 0.7127 - val_loss: 1.0749 - val_accuracy: 0.6534
     Epoch 21/100
                                     ===] - 19s 705ms/step - loss: 0.7802 - accuracy: 0.7160 - val loss: 0.9173 - val accuracy: 0.6878
    27/27 [==
    Fnoch 22/100
    27/27
                                 ======] - 19s 726ms/step - loss: 0.7298 - accuracy: 0.7286 - val_loss: 0.8706 - val_accuracy: 0.6984
    Epoch 23/100
    27/27 [=====
                            ========] - 19s 707ms/step - loss: 0.7457 - accuracy: 0.7286 - val loss: 0.8478 - val accuracy: 0.7222
    Epoch 24/100
27/27 [====
                                     ===] - 19s 705ms/step - loss: 0.7666 - accuracy: 0.7310 - val_loss: 0.9661 - val_accuracy: 0.6640
    Epoch 25/100
     27/27
                              ========] - 19s 704ms/step - loss: 0.7291 - accuracy: 0.7340 - val_loss: 0.9301 - val_accuracy: 0.6349
    Epoch 26/100
    27/27 [=====
                             ========] - 19s 706ms/step - loss: 0.7196 - accuracy: 0.7346 - val loss: 0.9996 - val accuracy: 0.6508
    Epoch 27/100
27/27 [=====
                                =======] - 19s 700ms/step - loss: 0.6934 - accuracy: 0.7454 - val_loss: 0.9406 - val_accuracy: 0.6772
    Epoch 28/100
    27/27
                              :=======] - 19s 703ms/step - loss: 0.6529 - accuracy: 0.7695 - val_loss: 0.9207 - val_accuracy: 0.6958
                               =======] - 19s 704ms/step - loss: 0.6110 - accuracy: 0.7866 - val loss: 1.1045 - val accuracy: 0.6270
    27/27 [=====
    Epoch 30/100
27/27 [====
                                  :=====] - 20s 721ms/step - loss: 0.6624 - accuracy: 0.7653 - val_loss: 0.7289 - val_accuracy: 0.7434
    Epoch 31/100
    27/27 [
                               :=======] - 19s 718ms/step - loss: 0.6641 - accuracy: 0.7589 - val_loss: 1.0379 - val_accuracy: 0.6349
          32/100
                                    ====] - 19s 714ms/step - loss: 0.6489 - accuracy: 0.7580 - val_loss: 0.8861 - val_accuracy: 0.7381
    27/27 [====
    Fnoch 33/100
    27/27
                                ======] - 19s 708ms/step - loss: 0.6153 - accuracy: 0.7836 - val_loss: 0.7685 - val_accuracy: 0.7407
    Epoch 34/100
    27/27 [=:
                          :=========] - 19s 720ms/step - loss: 0.6041 - accuracy: 0.7854 - val loss: 0.9471 - val accuracy: 0.6878
    Epoch 35/100
    27/27 [====
Epoch 36/100
                                :======] - 19s 706ms/step - loss: 0.6042 - accuracy: 0.7836 - val_loss: 0.8749 - val_accuracy: 0.7063
     27/27
                           =========] - 19s 708ms/step - loss: 0.5733 - accuracy: 0.7956 - val_loss: 1.1197 - val_accuracy: 0.6190
    Epoch 37/100
    27/27 [============= - - 19s 704ms/step - loss: 0.6675 - accuracy: 0.7580 - val loss: 0.9553 - val accuracy: 0.6746
    Epoch 38/100
    27/27 [===
                           =========] - 19s 703ms/step - loss: 0.6602 - accuracy: 0.7604 - val_loss: 0.7803 - val_accuracy: 0.7302
    27/27 [=====
                           40/100
                          =======] - ETA: 0s - loss: 0.5761 - accuracy: 0.7917
    Plot the Graph history
import matplotlib.pyplot as plt
acc = history.history['accuracy']
val_acc = history.history['val_accuracy']
loss = history.history['loss']
val_loss = history.history['val_loss']
epochs = range(len(acc))
```

5/24/22, 10:17 AM

```
plt.title('Training and validation accuracy')
plt.legend(loc=0)
plt.figure()
```

plt.show()



Model Prediction

```
## CODE BLOCK FOR NON-SAFARI BROWSERS
## SAFARI USERS: PLEASE SKIP THIS BLOCK AND RUN THE NEXT ONE INSTEAD
import numpy as np
from google.colab import files
from keras.preprocessing import image
uploaded = files.upload()
for fn in uploaded.keys():
   # predicting images
   path = fn
    img = image.load_img(path, target_size=(150, 150))
   x = image.img_to_array(img)
   x = np.expand_dims(x, axis=0)
   images = np.vstack([x])
   classes = model.predict(images, batch_size=10)
   print(fn)
   print(classes)
                   se Files 10 files
             794.png(image/png) - 8918 bytes, last modified: 5/12/2022 - 100% done
           841.png(image/png) - 8078 bytes, last modified: 5/14/2022 - 100% done 848.png(image/png) - 8078 bytes, last modified: 5/14/2022 - 100% done 910.png(image/png) - 11422 bytes, last modified: 5/14/2022 - 100% done 913.png(image/png) - 7160 bytes, last modified: 5/14/2022 - 100% done
            913.png(image/png) - 7160 bytes, last modified: 5/14/2022 - 100% done 980.png(image/png) - 6025 bytes, last modified: 5/14/2022 - 100% done 980.png(image/png) - 7964 bytes, last modified: 5/14/2022 - 100% done 986.png(image/png) - 5151 bytes, last modified: 5/14/2022 - 100% done 990.png(image/png) - 9159 bytes, last modified: 5/14/2022 - 100% done 1063.png(image/png) - 7044 bytes, last modified: 5/14/2022 - 100% done
        Saving 794.png to 794.png
Saving 841.png to 841.png
Saving 848.png to 848.png
        Saving 910.png to 910.png
        Saving 913.png to 913.png
Saving 963.png to 963.png
        Saving 980.png to 980 (1).png
Saving 986.png to 986 (2).png
Saving 990.png to 990.png
         Saving 1063.png to 1063.png
        794.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
         841.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
        848.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
        910.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
         913.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
        963.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
         980.png
[[0. 0. 0. 0. 0. 1. 0. 0.]]
          986.png
        [[0. 0. 0. 0. 0. 0. 0. 1.]]
        990.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
        1063.png
[[0. 0. 0. 0. 1. 0. 0. 0.]]
import time
saved_model_path = "./saved_model/{}.h5".format(int(time.time()))
model.save(saved_model_path)
!tensorflowjs_converter --input_format=keras {saved_model_path} ./saved_model/js/
!zip -r model.zip saved_model
            adding: saved model/ (stored 0%)
            adding: saved_model/.ipynb_checkpoints/ (stored 0%) adding: saved_model/1653361775.h5 (deflated 23%)
            adding: saved_model/js/ (stored 0%)
adding: saved_model/js/model.json (deflated 82%)
adding: saved_model/js/groupl-shard2of3.bin (deflated 7%)
adding: saved_model/js/group1-shard2of3.bin (deflated 7%)
            adding: saved_model/js/group1-shard1of3.bin (deflated 7%)
```

✓ 1s completed at 10:14 AM

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