

```
In [7]: import zipfile
```

```
In [ ]: # brew install wget
```

```
In [1]: # the image dataset contain only two classes pizza ad steak
!wget https://storage.googleapis.com/ztm_tf_course/food_vision/pizza_steak.zip
```

```
/bin/bash: wget: command not found
```

```
In [ ]: !wget https://storage.googleapis.com/ztm_tf_course/food_vision/pizza_steak.zip
```

```
zip_ref=zipfile.ZipFile("pizza_steak.zip")
zip_ref.extractall()
zip_ref.close()
```

```
--2022-09-20 09:18:46-- https://storage.googleapis.com/ztm_tf_course/food_vision/pizza_steak.zip
Resolving storage.googleapis.com (storage.googleapis.com)... 74.125.130.128, 74.125.68.128, 142.250.4.128, ...
Connecting to storage.googleapis.com (storage.googleapis.com)|74.125.130.128|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 109540975 (104M) [application/zip]
Saving to: 'pizza_steak.zip'
```

```
pizza_steak.zip 100%[=====] 104.47M 189MB/s in 0.6s
```

```
2022-09-20 09:18:47 (189 MB/s) - 'pizza_steak.zip' saved [109540975/109540975]
```

```
In [15]: #inspect data
```

```
!ls pizza_steak/train/
```

```
pizza steak
```

```
In [ ]: !ls pizza_steak/train/
```

```
pizza steak
```

```
In [ ]: !ls pizza_steak/train/steak
```

```
1021458.jpg 1658186.jpg 225990.jpg 2832499.jpg 3386119.jpg 421476.jpg
1032846.jpg 1658443.jpg 2260231.jpg 2832960.jpg 3388717.jpg 421561.jpg
10380.jpg 165964.jpg 2268692.jpg 285045.jpg 3389138.jpg 438871.jpg
1049459.jpg 167069.jpg 2271133.jpg 285147.jpg 3393547.jpg 43924.jpg
1053665.jpg 1675632.jpg 227576.jpg 2855315.jpg 3393688.jpg 440188.jpg
1068516.jpg 1678108.jpg 2283057.jpg 2856066.jpg 3396589.jpg 442757.jpg
1068975.jpg 168006.jpg 2286639.jpg 2859933.jpg 339891.jpg 443210.jpg
1081258.jpg 1682496.jpg 2287136.jpg 286219.jpg 3417789.jpg 444064.jpg
1090122.jpg 1684438.jpg 2291292.jpg 2862562.jpg 3425047.jpg 444709.jpg
1093966.jpg 168775.jpg 229323.jpg 2865730.jpg 3434983.jpg 447557.jpg
1098844.jpg 1697339.jpg 2300534.jpg 2878151.jpg 3435358.jpg 461187.jpg
1100074.jpg 1710569.jpg 2300845.jpg 2880035.jpg 3438319.jpg 461689.jpg
1105280.jpg 1714605.jpg 231296.jpg 2881783.jpg 3444407.jpg 465494.jpg
1117936.jpg 1724387.jpg 2315295.jpg 2884233.jpg 345734.jpg 468384.jpg
1126126.jpg 1724717.jpg 2323132.jpg 2890573.jpg 3460673.jpg 477486.jpg
114601.jpg 172936.jpg 2324994.jpg 2893832.jpg 3465327.jpg 482022.jpg
1147047.jpg 1736543.jpg 2327701.jpg 2893892.jpg 3466159.jpg 482465.jpg
1147883.jpg 1736968.jpg 2331076.jpg 2907177.jpg 3469024.jpg 483788.jpg
1155665.jpg 1746626.jpg 233964.jpg 290850.jpg 3470083.jpg 493029.jpg
1163977.jpg 1752330.jpg 2344227.jpg 2909031.jpg 3476564.jpg 503589.jpg
```

```
In [ ]: import os
```

```
In [ ]: for dirpath,dirnames,filenames in os.walk("pizza_steak"):
print(f"There are {len(dirnames)} directories and {len(filenames)} images in '{dirpath}'")
```

```
There are 2 directories and 0 images in 'pizza_steak'
There are 2 directories and 0 images in 'pizza_steak/train'
There are 0 directories and 750 images in 'pizza_steak/train/steak'
There are 0 directories and 750 images in 'pizza_steak/train/pizza'
There are 2 directories and 0 images in 'pizza_steak/test'
There are 0 directories and 250 images in 'pizza_steak/test/steak'
There are 0 directories and 250 images in 'pizza_steak/test/pizza'
```

```
In [ ]: num_steak_images_train=len(os.listdir("pizza_steak/train/steak"))
```

```
In [ ]: num_steak_images_train
```

```
Out[11]: 750
```

```
In [ ]: #get the classnames programmatically
```

```
import pathlib
import numpy as np
data_dir=pathlib.Path("pizza_steak/train")
class_names=np.array(sorted([item.name for item in data_dir.glob("*")]))
print(class_names)
```

```
['pizza' 'steak']
```

```
In [ ]: #visualize image
```

```

import matplotlib.pyplot as plt
import matplotlib.image as mpimg
import random

def view_random_image(target_dir,target_class):
    target_folder=target_dir+target_class

    #get random image path
    random_image = random.sample(os.listdir(target_folder), 1)
    print(random_image)

    img=mpimg.imread(target_folder + "/" +random_image[0])
    plt.imshow(img)
    plt.title(target_class)

    plt.axis("off")
    print(img.shape)

    return img

```

```

In [ ]: img=view_random_image(target_dir="pizza_steak/train/",target_class="pizza")

['147785.jpg']
(512, 384, 3)

```



```

In [ ]: img

```

```

Out[15]: array([[119, 157, 168],
                [131, 169, 180],
                [137, 173, 185],
                ...,
                [151, 115, 63],
                [166, 135, 81],
                [196, 169, 116]],

                [[144, 182, 191],
                [141, 178, 187],
                [134, 168, 180],
                ...,
                [152, 116, 64],
                [166, 136, 84],
                [197, 170, 117]],

                [[119, 154, 160],
                [133, 167, 176],
                [147, 181, 191],
                ...,
                [153, 117, 65],
                [169, 139, 87],
                [199, 173, 122]],

                ...,

                [[ 97, 125, 149],
                [ 97, 124, 151],
                [ 98, 125, 152],
                ...,
                [120, 183, 227],
                [123, 186, 230],
                [126, 189, 233]],

                [[ 94, 121, 150],
                [ 95, 122, 151],
                [ 97, 124, 154],
                ...,
                [119, 182, 226],
                [120, 183, 227],
                [121, 184, 228]],

                [[ 92, 119, 149],
                [ 93, 120, 150],
                [ 95, 121, 154],
                ...,
                [121, 184, 228],
                [119, 182, 226],
                [117, 180, 224]]], dtype=uint8)

```

```

In [ ]: import tensorflow as tf
        tf.constant(img)

```

```

Out[16]: <tf.Tensor: shape=(512, 384, 3), dtype=uint8, numpy=
array([[119, 157, 168],
       [131, 169, 180],
       [137, 173, 185],
       ...,
       [151, 115, 63],
       [166, 135, 81],
       [196, 169, 116],
       ...,
       [144, 182, 191],
       [141, 178, 187],
       [134, 168, 180],
       ...,
       [152, 116, 64],
       [166, 136, 84],
       [197, 170, 117],
       ...,
       [ 97, 125, 149],
       [ 97, 124, 151],
       [ 98, 125, 152],
       ...,
       [120, 183, 227],
       [123, 186, 230],
       [126, 189, 233],
       ...,
       [ 94, 121, 150],
       [ 95, 122, 151],
       [ 97, 124, 154],
       ...,
       [119, 182, 226],
       [120, 183, 227],
       [121, 184, 228],
       ...,
       [ 92, 119, 149],
       [ 93, 120, 150],
       [ 95, 121, 154],
       ...,
       [121, 184, 228],
       [119, 182, 226],
       [117, 180, 224]], dtype=uint8)>

```

```

[151, 115, 63],
[166, 135, 81],
[196, 169, 116]],

[[144, 182, 191],
[141, 178, 187],
[134, 168, 180],
...,
[152, 116, 64],
[166, 136, 84],
[197, 170, 117]],

[[119, 154, 160],
[133, 167, 176],
[147, 181, 191],
...,
[153, 117, 65],
[169, 139, 87],
[199, 173, 122]],

...,

[[ 97, 125, 149],
[ 97, 124, 151],
[ 98, 125, 152],
...,
[120, 183, 227],
[123, 186, 230],
[126, 189, 233]],

[[ 94, 121, 150],
[ 95, 122, 151],
[ 97, 124, 154],
...,
[119, 182, 226],
[120, 183, 227],
[121, 184, 228]],

[[ 92, 119, 149],
[ 93, 120, 150],
[ 95, 121, 154],
...,
[121, 184, 228],
[119, 182, 226],
[117, 180, 224]]], dtype=uint8)>

```

```
In [ ]: img.shape # returns width ,height, color channels
```

```
Out[17]: (512, 384, 3)
```

```
In [ ]: #normalize image i.e. turn between 0 and 1from
```

```
In [ ]: from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
In [ ]: tf.random.set_seed(42)
```

```
train_datagen=ImageDataGenerator(rescale=1./255)
valid_datagen=ImageDataGenerator(rescale=1./255)
```

```
In [ ]: train_dir="/content/pizza_steak/train"
test_dir="/content/pizza_steak/test"
```

```
In [ ]: train_data=train_datagen.flow_from_directory(directory=train_dir,
                                                    batch_size=32,
                                                    target_size=(224,224),
                                                    class_mode="binary",
                                                    seed=42)

valid_data=valid_datagen.flow_from_directory(directory=test_dir,
                                              batch_size=32,
                                              target_size=(224,224),
                                              class_mode="binary",
                                              seed=42)

model_1=tf.keras.models.Sequential([tf.keras.layers.Conv2D(filters=10,kernel_size=3,
                                                            activation="relu",
                                                            input_shape=(224,224,3)),

                                tf.keras.layers.Conv2D(10,3,activation="relu"),
                                tf.keras.layers.MaxPool2D(pool_size=2, padding="valid"),

                                tf.keras.layers.Conv2D(10,3,activation="relu"),
                                tf.keras.layers.Conv2D(10,3,activation="relu"),
                                tf.keras.layers.MaxPool2D(2),
                                tf.keras.layers.Flatten(),
                                tf.keras.layers.Dense(1,activation="sigmoid")
                                ])

```

```
Found 1500 images belonging to 2 classes.
Found 500 images belonging to 2 classes.
```

```
In [ ]: # compile CNN
```

```
model_1.compile(loss="binary_crossentropy",
               optimizer=tf.keras.optimizers.Adam(),
               metrics=["accuracy"])
```

```
In [ ]: #fit the model
```

```
history_1=model_1.fit(train_data,
                       epochs=5,
                       steps_per_epoch=len(train_data),
                       validation_data=valid_data,
                       validation_steps=len(valid_data))
```

```
Epoch 1/5
47/47 [=====] - 23s 208ms/step - loss: 0.5614 - accuracy: 0.7053 - val_loss: 0.4320 - val_ac
curacy: 0.7900
Epoch 2/5
47/47 [=====] - 9s 196ms/step - loss: 0.4360 - accuracy: 0.8080 - val_loss: 0.3649 - val_acc
uracy: 0.8500
Epoch 3/5
47/47 [=====] - 9s 197ms/step - loss: 0.3881 - accuracy: 0.8347 - val_loss: 0.3131 - val_acc
uracy: 0.8680
Epoch 4/5
47/47 [=====] - 9s 193ms/step - loss: 0.3564 - accuracy: 0.8473 - val_loss: 0.2918 - val_acc
uracy: 0.8700
Epoch 5/5
47/47 [=====] - 10s 214ms/step - loss: 0.2921 - accuracy: 0.8867 - val_loss: 0.2808 - val_ac
curacy: 0.8700
```

In []: