```python
from google.colab import drive
drive.mount('/content/drive')
```

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

```python
!unzip /content/drive/MyDrive/Flowers-Dataset.zip
```

```
      inflating: flowers/tulip/8695372372_302135aeb2.jpg
      inflating: flowers/tulip/8697784345_e75913d220.jpg
      inflating: flowers/tulip/8702982836_75222725d7.jpg
      inflating: flowers/tulip/8706523526_a0f161b72b.jpg
      inflating: flowers/tulip/8708209606_d3aede4801.jpg
      inflating: flowers/tulip/8708856019_f3be2353a4_n.jpg
      inflating: flowers/tulip/8710148289_6fc196a0f8_n.jpg
      inflating: flowers/tulip/8711277462_b43df5454b_m.jpg

      inflating: flowers/tulip/8712230357_1298b8513b.jpg
      inflating: flowers/tulip/8712243901_54d686319e_m.jpg
      inflating: flowers/tulip/8712244311_da8e90bf8e_n.jpg
      inflating: flowers/tulip/8712260079_c0ff42e0e2_n.jpg
      inflating: flowers/tulip/8712263493_3db76c5f82.jpg
      inflating: flowers/tulip/8712266605_3787e346cd_n.jpg
      inflating: flowers/tulip/8712267391_c756f18ee7_n.jpg
      inflating: flowers/tulip/8712267813_f7a9be2ec5.jpg
      inflating: flowers/tulip/8712268519_f4c2c39a06_n.jpg
      inflating: flowers/tulip/8712269349_2b933da2b8_n.jpg
      inflating: flowers/tulip/8712270243_8512cf4fbd.jpg
      inflating: flowers/tulip/8712270665_57b5bda0a2_n.jpg
      inflating: flowers/tulip/8712282563_3819afb7bc.jpg
      inflating: flowers/tulip/8713357842_9964a93473_n.jpg
      inflating: flowers/tulip/8713387500_6a9138b41b_n.jpg
      inflating: flowers/tulip/8713388322_e5ae26263b_n.jpg
      inflating: flowers/tulip/8713389178_66bceb71a8_n.jpg
      inflating: flowers/tulip/8713390684_041148dd3e_n.jpg
      inflating: flowers/tulip/8713391394_4b679ea1e3_n.jpg
      inflating: flowers/tulip/8713392604_90631fb809_n.jpg
      inflating: flowers/tulip/8713394070_b24561b0a9.jpg
      inflating: flowers/tulip/8713396140_5af8136136.jpg
      inflating: flowers/tulip/8713397358_0505cc0176_n.jpg
      inflating: flowers/tulip/8713397694_bcbcbba2c2_n.jpg
      inflating: flowers/tulip/8713398114_bc96f1b624_n.jpg
      inflating: flowers/tulip/8713398614_88202e452e_n.jpg
      inflating: flowers/tulip/8713398906_28e59a225a_n.jpg
      inflating: flowers/tulip/8713407768_f880df361f.jpg
      inflating: flowers/tulip/8717900362_2aa508e9e5.jpg
      inflating: flowers/tulip/8722514702_7ecc68691c.jpg
      inflating: flowers/tulip/8723767533_9145dec4bd_n.jpg
      inflating: flowers/tulip/8729501081_b993185542_m.jpg
      inflating: flowers/tulip/8733586143_3139db6e9e_n.jpg
      inflating: flowers/tulip/8748266132_5298a91dcf_n.jpg
      inflating: flowers/tulip/8750288831_5e49a9f29b.jpg
      inflating: flowers/tulip/8757486380_90952c5377.jpg
      inflating: flowers/tulip/8758464923_75a5ffe320_n.jpg
      inflating: flowers/tulip/8758519201_16e8d2d781_n.jpg
      inflating: flowers/tulip/8759594528_2534c0ec65_n.jpg
      inflating: flowers/tulip/8759597778_7fca5d434b_n.jpg
      inflating: flowers/tulip/8759601388_36e2a50d98_n.jpg
      inflating: flowers/tulip/8759606166_8e475013fa_n.jpg
      inflating: flowers/tulip/8759618746_f5e39fdhf8_n.jpg
```

```
inflating: flowers/tulip/8759618746_f5e59fdbf8_n.jpg
inflating: flowers/tulip/8762189906_8223cef62f.jpg
inflating: flowers/tulip/8762193202_0fbf2f6a81.jpg
inflating: flowers/tulip/8768645961_8f1e097170_n.jpg
inflating: flowers/tulip/8817622133_a42bb90e38_n.jpg
inflating: flowers/tulip/8838347159_746d14e6c1_m.jpg
inflating: flowers/tulip/8838354855_c474fc66a3_m.jpg
inflating: flowers/tulip/8838914676_8ef4db7f50_n.jpg
```

Image augmentation

```
import tensorflow as tenserflow
from tensorflow.keras.preprocessing.image import ImageDataGenerator

train_data_aug = ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True)

train_data_aug = ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True)

test_data_aug = ImageDataGenerator(rescale=1./255)
```

```
xtrain = train_data_aug.flow_from_directory('/content/flowers',target_size=(64,64),class_m
```
```
    Found 4317 images belonging to 5 classes.
```

```
xtest = test_data_aug.flow_from_directory('/content/flowers',target_size=(64,64),class_mod
```
```
    Found 4317 images belonging to 5 classes.
```

Create Model

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
```

Add Layers (Convolution, Max-Pooling, Flatten, Dense-(Hidden Layers), Output)

```
model = Sequential()
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3))) # Convolution l
model.add(MaxPooling2D(pool_size=(2,2))) # Max pooling layer
model.add(Flatten()) # Flatten layer
# Fully connected layers (ANN)
model.add(Dense(300,activation='relu')) # Hidden layer 1
model.add(Dense(150,activation='relu')) # Hidden layer 2
model.add(Dense(5,activation='softmax')) # Output layer
```

Compile the Model

```
model.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
```

Fit the Model

```
model.fit_generator(xtrain,
                    steps_per_epoch=len(xtrain),
                    epochs=10,
                    validation_data=xtest,
                    validation_steps=len(xtest))
```

```
    /usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:5: UserWarning: `Model.f
      """
    Epoch 1/10
    44/44 [==============================] - 45s 1s/step - loss: 1.6573 - accuracy: 0.388
    Epoch 2/10
    44/44 [==============================] - 45s 1s/step - loss: 1.1254 - accuracy: 0.546
    Epoch 3/10
    44/44 [==============================] - 43s 982ms/step - loss: 1.0353 - accuracy: 0
    Epoch 4/10
    44/44 [==============================] - 43s 968ms/step - loss: 0.9475 - accuracy: 0
    Epoch 5/10
    44/44 [==============================] - 43s 969ms/step - loss: 0.8927 - accuracy: 0
    Epoch 6/10
    44/44 [==============================] - 42s 965ms/step - loss: 0.8662 - accuracy: 0
    Epoch 7/10
    44/44 [==============================] - 42s 958ms/step - loss: 0.8227 - accuracy: 0
    Epoch 8/10
    44/44 [==============================] - 44s 1s/step - loss: 0.7793 - accuracy: 0.702
    Epoch 9/10
    44/44 [==============================] - 52s 1s/step - loss: 0.7464 - accuracy: 0.716
    Epoch 10/10
    44/44 [==============================] - 48s 1s/step - loss: 0.7318 - accuracy: 0.718
    <keras.callbacks.History at 0x7fa505a45c10>
```

Save the Model

```
model.save('/content/flowers')
```

```
    WARNING:absl:Found untraced functions such as _jit_compiled_convolution_op while savi
```

Test the Model

```
import numpy as np
from tensorflow.keras.preprocessing import image
```

```
img = image.load_img('/content/flowers/rose/10503217854_e66a804309.jpg',target_size=(64,64
```

```
img
```



```
x = image.img_to_array(img)
x
```

```
array([[[  0.,    2.,    0.],
        [  0.,    2.,    0.],
        [  0.,    2.,    0.],
        ...,
        [ 92.,   14.,    0.],
        [ 61.,   13.,    9.],
        [ 17.,    7.,    5.]],

       [[  0.,    2.,    0.],
        [  0.,    2.,    0.],
        [  0.,    2.,    0.],
        ...,
        [150.,    3.,    0.],
        [ 85.,   10.,    7.],
        [119.,    4.,    1.]],

       [[  0.,    2.,    0.],
        [  0.,    2.,    0.],
        [  0.,    2.,    0.],
        ...,
        [ 88.,    9.,    0.],
        [207.,    7.,   10.],
        [152.,    0.,    0.]],

       ...,

       [[  0.,    4.,    0.],
        [  1.,    3.,    0.],
        [  0.,    2.,    0.],
        ...,
        [  2.,    2.,    4.],
        [  0.,    2.,    5.],
        [ 51.,   10.,    6.]],

       [[  0.,    2.,    0.],
        [  1.,    3.,    0.],
        [  1.,    3.,    0.],
        ...,
        [  0.,    3.,    1.],
        [  0.,    3.,    4.],
        [  0.,    5.,    3.]],

       [[  1.,    3.,    0.],
        [  0.,    2.,    0.],
        [  1.,    1.,    0.],
        ...,
        [ 29.,    5.,    1.],
```

```
            [ 41.,   13.,    0.],
            [  5.,    4.,    0.]]], dtype=float32)
```

```
x = np.expand_dims(x,axis=0)
x
```

```
array([[[[  0.,    2.,    0.],
         [  0.,    2.,    0.],
         [  0.,    2.,    0.],
         ...,
         [ 92.,   14.,    0.],
         [ 61.,   13.,    9.],
         [ 17.,    7.,    5.]],

        [[  0.,    2.,    0.],
         [  0.,    2.,    0.],
         [  0.,    2.,    0.],
         ...,
         [150.,    3.,    0.],
         [ 85.,   10.,    7.],
         [119.,    4.,    1.]],

        [[  0.,    2.,    0.],
         [  0.,    2.,    0.],
         [  0.,    2.,    0.],
         ...,
         [ 88.,    9.,    0.],
         [207.,    7.,   10.],
         [152.,    0.,    0.]],

        ...,

        [[  0.,    4.,    0.],
         [  1.,    3.,    0.],
         [  0.,    2.,    0.],
         ...,
         [  2.,    2.,    4.],
         [  0.,    2.,    5.],
         [ 51.,   10.,    6.]],

        [[  0.,    2.,    0.],
         [  1.,    3.,    0.],
         [  1.,    3.,    0.],
         ...,
         [  0.,    3.,    1.],
         [  0.,    3.,    4.],
         [  0.,    5.,    3.]],

        [[  1.,    3.,    0.],
         [  0.,    2.,    0.],
         [  1.,    1.,    0.],
         ...,
         [ 29.,    5.,    1.],
         [ 41.,   13.,    0.],
         [  5.,    4.,    0.]]]], dtype=float32)
```

```
model.predict(x)
```

```
1/1 [==============================] - 0s 132ms/step
array([[0., 0., 0., 0., 1.]], dtype=float32)
```

```
xtrain.class_indices
```

```
{'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}
```

```python
op = ['daisy','dandelion','rose','sunflower','tulip']
pred = np.argmax(model.predict(x))
op[pred]
```

```
1/1 [==============================] - 0s 48ms/step
'tulip'
```

```python
img = image.load_img('/content/flowers/dandelion/10043234166_e6dd915111_n.jpg',target_size
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = np.argmax(model.predict(x))
op[pred]
```

```
1/1 [==============================] - 0s 25ms/step
'daisy'
```

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