

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

```
inflating: flowers/tulip/8686013485_5c4ut0t0u1r_n.jpg
inflating: flowers/tulip/8686332852_c6dcb2e86b.jpg
inflating: flowers/tulip/8687675254_c93f50d8b0_m.jpg
inflating: flowers/tulip/8688502760_1c8d6de921_m.jpg
inflating: flowers/tulip/8689672277_b289909f97_n.jpg
inflating: flowers/tulip/8690789564_394eb04982_n.jpg
inflating: flowers/tulip/8690791226_b1f015259f_n.jpg
inflating: flowers/tulip/8695367666_0809529eaf_n.jpg
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

```

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```

inflating: flowers/tulip/8737480380_20552c5377.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_f5e39fdbf8_n.jpg

```

## Image augmentation

```

import tensorflow as tensorflow
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_mode='categorical', batch_size=100)

```

Found 4317 images belonging to 5 classes.

```
xtest = test_data_aug.flow_from_directory('/content/flowers',target_size=(64,64),class_mode='categorical',batch_size=100)
```

Found 4317 images belonging to 5 classes.

## Create Model

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

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```
model = Sequential()
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3))) # Convolution 1
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:6: UserWarning: `Model.fit_generator` is deprecated and will be re
```

```
Epoch 1/10
```

```
44/44 [=====] - 33s 726ms/step - loss: 1.7001 - accuracy: 0.3535 - val_loss: 1.2031 - val_accuracy: 0.
```

```
Epoch 2/10
```

```
44/44 [=====] - 32s 720ms/step - loss: 1.1267 - accuracy: 0.5464 - val_loss: 1.0732 - val_accuracy: 0.
```

```
Epoch 3/10
```

```
44/44 [=====] - 31s 714ms/step - loss: 1.0360 - accuracy: 0.5979 - val_loss: 0.9539 - val_accuracy: 0.
```

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```
Epoch 5/10
```

```
44/44 [=====] - 34s 777ms/step - loss: 0.9185 - accuracy: 0.6437 - val_loss: 0.8739 - val_accuracy: 0.
```

```
Epoch 6/10
```

```
44/44 [=====] - 32s 720ms/step - loss: 0.8863 - accuracy: 0.6597 - val_loss: 0.8482 - val_accuracy: 0.
```

```
Epoch 7/10
```

```
44/44 [=====] - 31s 710ms/step - loss: 0.8396 - accuracy: 0.6776 - val_loss: 0.7952 - val_accuracy: 0.
```

```
Epoch 8/10
```

```
44/44 [=====] - 31s 709ms/step - loss: 0.7886 - accuracy: 0.7040 - val_loss: 0.7530 - val_accuracy: 0.
```

```
Epoch 9/10
```

```
44/44 [=====] - 31s 711ms/step - loss: 0.7735 - accuracy: 0.7109 - val_loss: 0.6811 - val_accuracy: 0.
```

```
Epoch 10/10
```

```
44/44 [=====] - 31s 720ms/step - loss: 0.7321 - accuracy: 0.7213 - val_loss: 0.6886 - val_accuracy: 0.
```

```
<keras.callbacks.History at 0x7f119b44fb90>
```

## Save the Model

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

```
WARNING:absl:Found untraced functions such as _jit_compiled_convolution_op while saving (showing 1 of 1). These functions will
```

## 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
```



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```
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.]
```

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```
...,
[ 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.],
[ 70.,  7., 10.]]

```

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```

...
[[ 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 106ms/step  
array([[0., 0., 1., 0., 0.]], dtype=float32)
```

```
xtrain.class_indices
```

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

```
op = ['daisy','dandelion','rose','sunflower','tulip']
```

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```
1/1 [=====] - 0s 20ms/step  
'rose'
```

```
img = image.load_img('/content/flowers/dandelion/10043234166_e6dd915111_n.jpg',target_size=(64,64))  
x = image.img_to_array(img)  
x = np.expand_dims(x,axis=0)  
pred = np.argmax(model.predict(x))  
op[pred]
```

```
1/1 [=====] - 0s 21ms/step  
'daisy'
```



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