

```
In [56]: from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
In [57]: train_datagen = ImageDataGenerator(rescale= 1./255,horizontal_flip = True,vertical_flip = True,zoom_range = 0.2)
```

```
In [58]: test_datagen = ImageDataGenerator(rescale= 1./255)
```

```
In [59]: x_train = train_datagen.flow_from_directory(r"C:\Users\ADMIN\Desktop\flowers",target_size = (64,64),
                                                    class_mode = "categorical",batch_size = 24)
```

Found 4317 images belonging to 5 classes.

```
In [60]: x_test = test_datagen.flow_from_directory(r"C:\Users\ADMIN\Desktop\flowers",target_size = (64,64),
                                                  class_mode = "categorical",batch_size = 24)
```

Found 4317 images belonging to 5 classes.

```
In [61]: x_train.class_indices
```

```
Out[61]: {'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}
```

```
In [62]: from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D,Flatten,Dense
```

```
In [63]: model=Sequential()
```

```
In [64]: model.add(Convolution2D(32,(3,3),input_shape=(64,64,3),activation='relu'))
```

```
In [65]: model.add(MaxPooling2D(pool_size=(2,2)))
```

```
In [66]: model.add(Flatten())
```

```
In [67]: model.summary()
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
=====		
conv2d_1 (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d_1 (MaxPooling 2D)	(None, 31, 31, 32)	0
flatten_1 (Flatten)	(None, 30752)	0

=====

Total params: 896
Trainable params: 896
Non-trainable params: 0

=====

```
In [68]: model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))
```

```
In [69]: model.add(Dense(5,activation='softmax'))
```

```
In [70]: model.compile(loss='categorical_crossentropy',metrics=['accuracy'],optimizer='adam')
```

```
In [71]: len(x_train)
```

```
Out[71]: 180
```

```
In [72]: model.fit(x_train, epochs = 2, validation_data=x_test, steps_per_epoch=len(x_train), validation_steps=len(x_test))
```

Epoch 1/2
180/180 [=====] - 28s 153ms/step - loss: 1.2501 - accuracy: 0.4807 - val_loss: 1.1886 - val_accuracy: 0.5242
Epoch 2/2
180/180 [=====] - 27s 149ms/step - loss: 1.0602 - accuracy: 0.5719 - val_loss: 1.1136 - val_accuracy: 0.5617

```
Out[72]: <keras.callbacks.History at 0x205cb6d6170>
```

```
In [73]: model.save('flowers.h5')
```

```
In [74]: import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

```
In [75]: model=load_model('flowers.h5')
```

```
In [76]: img=image.load_img(r"C:\Users\ADMIN\Desktop\flowers\daisy\107592979_aaa9cdfe78_m.jpg")
```

```
In [77]: img
```

Out[77]:



```
In [78]: img=image.load_img(r"C:\Users\ADMIN\Desktop\flowers\daisy\107592979_aaa9cdfe78_m.jpg", target_size=(64,64))
img
```

Out[78]:



```
In [79]: x=image.img_to_array(img)
```

```
In [80]: x
```

Out[80]:

```
array([[ [35., 68., 11.],
        [31., 54., 12.],
        [34., 55., 14.],
        ...,
        [ 2.,  2.,  2.],
        [ 2.,  2.,  2.],
        [ 2.,  2.,  2.]],

       [[41., 76., 12.],
        [40., 67., 16.],
        [34., 53.,  8.],
        ...,
        [ 0.,  2.,  1.],
        [ 0.,  0.,  0.],
        [ 0.,  0.,  0.]],

       [[32., 65., 10.],
        [39., 63., 11.],
        [40., 64., 16.],
        ...,
        [14., 29.,  6.],
        [16., 32.,  5.],
        [13., 27.,  2.]],

       ...,

       [[10., 21.,  4.],
        [ 9., 22.,  2.],
        [16., 30.,  7.],
        ...,
        [ 5., 16.,  2.],
        [ 2.,  7.,  1.],
        [ 4., 11.,  3.]],

       [[ 4., 15.,  1.],
        [ 5., 16.,  0.],
        [14., 30.,  4.],
        ...,
        [ 1.,  3.,  0.],
        [ 4.,  9.,  3.],
        [ 4.,  9.,  3.]],

       [[ 2.,  7.,  1.],
        [11., 22.,  5.],
        [17., 31.,  6.],
        ...,
        [ 2.,  2.,  0.],
        [ 3.,  5.,  2.],
        [ 2., 12.,  1.] ]], dtype=float32)
```

```
In [81]: x=np.expand_dims(x,axis=0)
x
```

```
Out[81]: array([[[[35., 68., 11.],
                  [31., 54., 12.],
                  [34., 55., 14.],
                  ...,
                  [ 2.,  2.,  2.],
                  [ 2.,  2.,  2.],
                  [ 2.,  2.,  2.]],

                 [[41., 76., 12.],
                  [40., 67., 16.],
                  [34., 53.,  8.],
                  ...,
                  [ 0.,  2.,  1.],
                  [ 0.,  0.,  0.],
                  [ 0.,  0.,  0.]],

                 [[32., 65., 10.],
                  [39., 63., 11.],
                  [40., 64., 16.],
                  ...,
                  [14., 29.,  6.],
                  [16., 32.,  5.],
                  [13., 27.,  2.]],

                 ...,

                 [[10., 21.,  4.],
                  [ 9., 22.,  2.],
                  [16., 30.,  7.],
                  ...,
                  [ 5., 16.,  2.],
                  [ 2.,  7.,  1.],
                  [ 4., 11.,  3.]],

                 [[ 4., 15.,  1.],
                  [ 5., 16.,  0.],
                  [14., 30.,  4.],
                  ...,
                  [ 1.,  3.,  0.],
                  [ 4.,  9.,  3.],
                  [ 4.,  9.,  3.]],

                 [[ 2.,  7.,  1.],
                  [11., 22.,  5.],
                  [17., 31.,  6.],
                  ...,
                  [ 2.,  2.,  0.],
                  [ 3.,  5.,  2.],
                  [ 2., 12.,  1.]]]], dtype=float32)
```

```
In [82]: y=np.argmax(model.predict(x),axis=0)

1/1 [=====] - 0s 74ms/step
```

```
In [83]: y
```

```
Out[83]: array([0, 0, 0, 0, 0], dtype=int64)
```

```
In [84]: x_train.class_indices
```

```
Out[84]: {'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}
```

```
In [85]: index=['daisy','dandelion','rose','sunflower']
```

```
In [86]: index[y[0]]
```

```
Out[86]: 'daisy'
```

```
In [87]: img=image.load_img(r"C:\Users\ADMIN\Desktop\flowers\dandelion\751941983_58e1ae3957_m.jpg", target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower']
index[y[0]]
```

```
1/1 [=====] - 0s 33ms/step
```

```
Out[87]: 'sunflower'
```

In [88]: img

Out[88]:



```
In [89]: img=image.load_img(r"C:\Users\ADMIN\Desktop\flowers\rose\3664842094_5fd60ee26b.jpg", target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','rose','dandelion','sunflower']
index[y[0]]
```

1/1 [=====] - 0s 27ms/step

Out[89]: 'dandelion'

In [90]: img

Out[90]:



```
In [93]: img=image.load_img(r"C:\Users\ADMIN\Desktop\flowers\sunflower\3840761441_7c648abf4d_n.jpg", target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=0)
index=['sunflower','daisy','dandelion','rose']
index[y[0]]
```

1/1 [=====] - 0s 22ms/step

Out[93]: 'sunflower'

In [94]: img

Out[94]:



In []: