

**Assignment -3**  
Python Programming

Assignment Date	29 September 2022
Student Name	Jaswanth
Student Roll Number	720819106042
Maximum Marks	2 Marks

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

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```
flowers/daisy/100080576_f52e8ee070_n.jpg  
flowers/daisy/10140303196_b88d3d6cec.jpg  
flowers/daisy/10172379554_b296050f82_n.jpg  
flowers/daisy/10172567486_2748826a8b.jpg  
flowers/daisy/10172636503_21bededa75_n.jpg  
flowers/daisy/102841525_bd6628ae3c.jpg  
flowers/daisy/10300722094_28fa978807_n.jpg  
flowers/daisy/1031799732_e7f4008c03.jpg  
flowers/daisy/10391248763_1d16681106_n.jpg  
flowers/daisy/10437754174_22ec990b77_m.jpg  
flowers/daisy/10437770546_8bb6f7bdd3_m.jpg
```

```
inflating:  
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```

```

flowers/daisy/10437929963_bc13eebe0c.jpg inflating:
flowers/daisy/10466290366_cc72e33532.jpg inflating:
flowers/daisy/10466558316_a7198b87e2.jpg inflating:
flowers/daisy/10555749515_13a12a026e.jpg inflating:
flowers/daisy/10555815624_dc211569b0.jpg inflating:
flowers/daisy/10555826524_423eb8bf71_n.jpg inflating:
flowers/daisy/10559679065_50d2b16f6d.jpg inflating:
flowers/daisy/105806915_a9c13e2106_n.jpg inflating:
flowers/daisy/10712722853_5632165b04.jpg inflating:
flowers/daisy/107592979_aaa9cdf78_m.jpg inflating:
flowers/daisy/10770585085_4742b9dac3_n.jpg inflating:
flowers/daisy/10841136265_af473efc60.jpg inflating:
flowers/daisy/10993710036_2033222c91.jpg inflating:
flowers/daisy/10993818044_4c19b86c82.jpg inflating:
flowers/daisy/10994032453_ac7f8d9e2e.jpg inflating:
flowers/daisy/11023214096_b5b39fab08.jpg inflating:
flowers/daisy/11023272144_fce94401f2_m.jpg inflating:
flowers/daisy/11023277956_8980d53169_m.jpg inflating:
flowers/daisy/11124324295_503f3a0804.jpg inflating:
flowers/daisy/1140299375_3aa7024466.jpg inflating:
flowers/daisy/11439894966_dca877f0cd.jpg inflating:
flowers/daisy/1150395827_6f94a5c6e4_n.jpg inflating:
flowers/daisy/11642632_1e7627a2cc.jpg inflating:

flowers/daisy/11834945233_a53b7a92ac_m.jpg inflating:
flowers/daisy/11870378973_2ec1919f12.jpg inflating:
flowers/daisy/11891885265_ccefec7284_n.jpg inflating:
flowers/daisy/12193032636_b50ae7db35_n.jpg inflating:
flowers/daisy/12348343085_d4c396e5b5_m.jpg inflating:
flowers/daisy/12585131704_0f64b17059_m.jpg inflating:
Archive: /content/drive/MyDrive/Flowers-Dataset.zip inflating:
flowers/daisy/12601254324_3cb62c254a_m.jpg
Saved successfully! inflating: flowers/daisy/1265350143_6e2b276ec9.jpg
inflating: flowers/daisy/12701063955_4840594ea6_n.jpg inflating:
flowers/daisy/1285423653_18926dc2c8_n.jpg inflating:
flowers/daisy/1286274236_1d7ac84efb_n.jpg inflating:
flowers/daisy/12891819633_e4c82b51e8.jpg inflating:
flowers/daisy/1299501272_59d9da5510_n.jpg inflating:
flowers/daisy/1306119996_ab8ae14d72_n.jpg inflating:
flowers/daisy/1314069875_da8dc023c6_m.jpg inflating:
flowers/daisy/1342002397_9503c97b49.jpg inflating:
flowers/daisy/134409839_71069a95d1_m.jpg inflating:
flowers/daisy/1344985627_c3115e2d71_n.jpg inflating:
flowers/daisy/13491959645_2cd9df44d6_n.jpg inflating:
flowers/daisy/1354396826_2868631432_m.jpg inflating:
flowers/daisy/1355787476_32e9f2a30b.jpg inflating:
flowers/daisy/13583238844_573df2de8e_m.jpg
inflating: flowers/daisy/1374193928_a52320eafa.jpg

```

## 2. Image Augmentation

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

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

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

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

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

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

Found 4317 images belonging to 5 classes.

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

Found 4317 images belonging to 5 classes.

### 3.Create Model

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

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### 4.Add Layers

```
model = Sequential() #Initializing sequential model
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3))) #Convolution 1
model.add(MaxPooling2D(pool_size=(2,2))) #MaxPooling layer model.add(Flatten()) #Flatten
layer model.add(Dense(300,activation='relu')) #Hidden layer 1
model.add(Dense(150,activation='relu')) #Hidden layer 2
model.add(Dense(4,activation='softmax')) #Output layer
```

### 5.Compile the Model

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

### 6.Fit the Model

```
from keras.callbacks import EarlyStopping, ReduceLROnPlateau
```

## 7. Save the Model

```
model.save('flowers.h5')
```

```
early_stopping = EarlyStopping(monitor='val_accuracy',
patience=5)
reduce_lr = ReduceLROnPlateau(monitor='val_accuracy',
patience=5,
factor=0.5,min_lr=0.00001) callback =
[reduce_lr,early_stopping]
```

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

## 8. Test the Model

```
import Saved successfully! numpy as np
from tensorflow.keras.preprocessing import image
```

```
img = image.load_img('/content/flowers/daisy/10391248763_1d16681106_n.jpg',target_size=(64
```

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

```
array([[ 85., 121., 107.],
[142., 147., 125.],      [253.,
255., 249.],
...,
```

```
[ 59., 72., 62.],
[ 31., 50., 46.],
[100., 116., 71.]],
```

```
[[ 88., 104., 119.],
[186., 193., 235.],
[239., 244., 240.],
...,
[ 83., 109., 74.],
[110., 132., 93.],
[ 51., 60., 67.]],
```

```
[[142., 150., 163.],
[243., 254., 248.],
[247., 247., 255.],
...,
```

```

        [255., 254., 250.],
        [114., 131., 139.],
        [ 40.,  42.,  37.]],

    ...,

    [[ 40.,  72.,  35.],
     [ 52.,  88.,  44.],
     [ 46.,  70.,  34.],

    ...,

     [ 44.,  75.,  31.],
     [ 55.,  87.,  37.],
     [ 43.,  74.,  33.]],

    [[ 49.,  85.,  37.],
     [ 58.,  93.,  37.],
     [ 35.,  66.,  22.],

    ...,

     [ 31.,  61.,  11.],
     [ 52.,  82.,  30.],
     [ 53.,  87.,  36.]],

    [[ 49.,  75.,  36.],
     [ 62.,  96.,  46.],
     [ 42.,  68.,  23.],

    ...,

     [ 61.,  93.,  44.],
     [ 60.,  86.,  51.],
     [ 41.,  67.,  30.]]], dtype=float32)

```

Saved successfully!

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

```

array([[[[ 85., 121., 107.],
          [142., 147., 125.],
          [253., 255., 249.],
          ...,
          [ 59.,  72.,  62.],
          [ 31.,  50.,  46.],
          [100., 116.,  71.]],

         [[ 88., 104., 119.],
          [186., 193., 235.],
          [239., 244., 240.],
          ...,
          [ 83., 109.,  74.],
          [110., 132.,  93.],
          [ 51.,  60.,  67.]],

         [[142., 150., 163.],
          [243., 254., 248.],
          [247., 247., 255.],

    ...,

         [255., 254., 250.],
         [114., 131., 139.],
         [ 40.,  42.,  37.]],

```

```

...,
[[ 40.,  72.,  35.],
 [ 52.,  88.,  44.],
 [ 46.,  70.,  34.],
...,
 [ 44.,  75.,  31.],
 [ 55.,  87.,  37.],
 [ 43.,  74.,  33.]],

[[ 49.,  85.,  37.],
 [ 58.,  93.,  37.],
 [ 35.,  66.,  22.],
...,
 [ 31.,  61.,  11.],
 [ 52.,  82.,  30.],
 [ 53.,  87.,  36.]],

[[ 49.,  75.,  36.],
 [ 62.,  96.,  46.],
 [ 42.,  68.,  23.],
...,
 [ 61.,  93.,  44.],
 [ 60.,  86.,  51.],
 [ 41.,  67.,  30.]]], dtype=float32)

```

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

```

array([[9.9999833e-01, 0.0000000e+00, 1.6717552e-06, 3.8870642e-20]],
      dtype=float32)

```

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```

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

```

'daisy'

```

img = image.load_img('/content/flowers/rose/11233672494_d8bf0a3dbf_n.jpg', target_size=(64,
x = image.img_to_array(img) x = np.expand_dims(x, axis=0) pred =
np.argmax(model.predict(x))

```

```
op[pred]
```

```
    'rose'
```

```
img = image.load_img('/content/flowers/dandelion/10828951106_c3cd47983f.jpg',target_size=(
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = np.argmax(model.predict(x))
op[pred]
```

```
    'rose'
```

```
img = image.load_img('/content/flowers/tulip/112951086_150a59d499_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]
```

```
    'rose'
```

```
img = image.load_img('/content/flowers/sunflower/1244774242_25a20d99a9.jpg',target_size=(64
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = np.argmax(model.predict(x))
op[pred]
```

```
    'rose'
```

Saved successfully!