

# Assignment -3

## Build CNN Model for Classification Of Flowers

Assignment Date	09 October 2022
Student Name	A. Muthamizhan
Student Roll Number	912419104018
Maximum Marks	2 Marks

### Task 1:

1. Download the Dataset : [Dataset](#)

#### Solution:

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

#### Build CNN model for Classification of Flowers

##### 1. Download the Dataset [dataset](#)

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

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force\_remount=True).

```
# unzip the file
```

```
!unzip "/content/drive/MyDrive/Colab Notebooks/muthamizhan/Flowers-Dataset.zip"
```

```
!unzip "/content/drive/MyDrive/Colab Notebooks/muthamizhan/Flowers-Dataset.zip"
```

Archive: /content/drive/MyDrive/Colab Notebooks/muthamizhan/Flowers-Dataset.zip

```
inflating: flowers/daisy/100080576_f52e8ee070_n.jpg
inflating: flowers/daisy/10140303196_b88d3d6cec.jpg
inflating: flowers/daisy/10172379554_b296050f82_n.jpg
inflating: flowers/daisy/10172567486_2748826a8b.jpg
inflating: flowers/daisy/10172636503_21bededa75_n.jpg
inflating: flowers/daisy/102841525_bd6628ae3c.jpg
inflating: flowers/daisy/10300722094_28fa978807_n.jpg
inflating: flowers/daisy/1031799732_e7fa008c03.jpg
inflating: flowers/daisy/10391248763_1d16681106_n.jpg
inflating: flowers/daisy/10437754174_22ec990b77_m.jpg
inflating: flowers/daisy/10437770546_8bb6f7bdd3_m.jpg
inflating: flowers/daisy/10437929963_bc13eebe0c.jpg
inflating: flowers/daisy/10466298366_cc72e33532.jpg
inflating: flowers/daisy/10466558316_a7198b87e2.jpg
inflating: flowers/daisy/10555749515_13a12a026e.jpg
inflating: flowers/daisy/10555815624_dc211569b0.jpg
inflating: flowers/daisy/10555826524_423eb80f71_n.jpg
inflating: flowers/daisy/10550679065_5ed2b16fed.jpg
inflating: flowers/daisy/105806915_a9c13e2106_n.jpg
inflating: flowers/daisy/10712722853_5632165b04.jpg
inflating: flowers/daisy/107592979_aaa9cdfef70_m.jpg
inflating: flowers/daisy/10770585085_4742b0dac3_n.jpg
inflating: flowers/daisy/10841136265_af473efc60.jpg
inflating: flowers/daisy/10993710036_2033222c91.jpg
inflating: flowers/daisy/10993818044_4c19b086c02.jpg
inflating: flowers/daisy/10994032453_ac7f8d9e2e.jpg
```

### Task 2:

2. Image Augmentation

### Solution:

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

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

x_train = train_datagen.flow_from_directory(r"/content/flowers", target_size =
(64,64) , class_mode = "categorical", batch_size = 100)
"
```

### ▼ 2. Image Augmentation

```
✓ [22] from tensorflow.keras.preprocessing.image import ImageDataGenerator
0s
train_datagen = ImageDataGenerator(rescale = 1./255, horizontal_flip = True, vertical_flip = True, zoom_range = 0.2)

x_train = train_datagen.flow_from_directory(r"/content/flowers", target_size = (64,64) , class_mode = "categorical", batch_size = 100)

Found 4317 images belonging to 5 classes.
```

## Task 3:

### 3. Create Model

### Solution:

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

model = Sequential()
```

### ▼ 3. Create Model

```
✓ [23] from tensorflow.keras.models import Sequential
0s
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense

model = Sequential()
```

## Task 4:

Add Layers (Convolution,MaxPooling,Flatten,Dense-(Hidden Layers),Output)

### Solution:

```
model.add(Convolution2D(32, (3,3), activation = "relu", input_shape = (64,64,3) ))
model.add(MaxPooling2D(pool_size = (2,2)))
model.add(Flatten())
model.add(Dense(300, activation = "relu"))
```

```
model.add(Dense(150, activation = "relu")) #multiple dense layers
model.add(Dense(5, activation = "softmax")) #output layer
```

#### ▼ 4. Add the layers (Convolution, MaxPooling, Flatten, Dense-(HiddenLayers), Output)

```
✓ [24] model.add(Convolution2D(32, (3,3), activation = "relu", input_shape = (64,64,3) ))
0s model.add(MaxPooling2D(pool_size = (2,2)))
model.add(Flatten())
model.add(Dense(300, activation = "relu"))
model.add(Dense(150, activation = "relu")) #multiple dense layers
model.add(Dense(5, activation = "softmax")) #output layer
```

## Task 5:

### 5. Compile The Model

#### Solution:

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

#### ▼ 5. Compile The Model

```
✓ [25] model.compile(loss = "categorical_crossentropy", metrics = ["accuracy"], optimizer = "adam")
0s len(x_train)
```

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## Task 6:

### 6. Fit The Model

#### Solution:

```
model.fit(x_train, epochs = 15, steps_per_epoch = len(x_train))
```

## 6. Fit The Model

```
✓ [26] model.fit(x_train, epochs = 15, steps_per_epoch = len(x_train))
3m

Epoch 1/15
44/44 [=====] - 14s 299ms/step - loss: 1.4965 - accuracy: 0.3864
Epoch 2/15
44/44 [=====] - 13s 295ms/step - loss: 1.1444 - accuracy: 0.5281
Epoch 3/15
44/44 [=====] - 13s 294ms/step - loss: 1.0495 - accuracy: 0.5879
Epoch 4/15
44/44 [=====] - 13s 293ms/step - loss: 0.9727 - accuracy: 0.6196
Epoch 5/15
44/44 [=====] - 13s 292ms/step - loss: 0.9343 - accuracy: 0.6345
Epoch 6/15
44/44 [=====] - 13s 290ms/step - loss: 0.8998 - accuracy: 0.6423
Epoch 7/15
44/44 [=====] - 13s 291ms/step - loss: 0.8661 - accuracy: 0.6627
Epoch 8/15
44/44 [=====] - 13s 299ms/step - loss: 0.8560 - accuracy: 0.6648
Epoch 9/15
44/44 [=====] - 13s 292ms/step - loss: 0.8039 - accuracy: 0.6875
Epoch 10/15
44/44 [=====] - 13s 300ms/step - loss: 0.7862 - accuracy: 0.6945
Epoch 11/15
44/44 [=====] - 13s 292ms/step - loss: 0.7879 - accuracy: 0.6931
Epoch 12/15
44/44 [=====] - 13s 290ms/step - loss: 0.7752 - accuracy: 0.7088
Epoch 13/15
44/44 [=====] - 13s 292ms/step - loss: 0.7512 - accuracy: 0.7169
Epoch 14/15
44/44 [=====] - 13s 288ms/step - loss: 0.7153 - accuracy: 0.7267
Epoch 15/15
44/44 [=====] - 13s 290ms/step - loss: 0.7279 - accuracy: 0.7181
<keras.callbacks.History at 0x7f72c927a6d0>
```

### model.summary()

```
✓ [27] model.summary()
0s

Model: "sequential_2"

Layer (type)                 Output Shape                 Param #
-----
conv2d_3 (Conv2D)            (None, 62, 62, 32)          896

max_pooling2d_2 (MaxPooling  (None, 31, 31, 32)          0
2D)

flatten_2 (Flatten)          (None, 30752)                0

dense_6 (Dense)               (None, 300)                  9225900

dense_7 (Dense)               (None, 150)                  45150

dense_8 (Dense)               (None, 5)                    755

Total params: 9,272,701
Trainable params: 9,272,701
Non-trainable params: 0
```

## Task 7:

### 7. Save The Model

#### Solution:

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

### 7. Save The Model

```
✓ [28] model.save("flowers.h5")
```

## Task 8:

### 9. Test The Model

#### Solution:

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

model = load_model("/content/flowers.h5")
img = image.load_img("/content/Tulip-image.jpg", target_size = (64,64))
x = image.img_to_array(img)
x = np.expand_dims(x,axis = 0)
pred = model.predict(x)

labels = ['daisy','dandelion','roses','sunflowers','tulips']
print("Input image is")
img

print("Classification of Flower is:",labels[np.argmax(pred)])
```

#### 8. Test The Model

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

    model = load_model("/content/flowers.h5")
    img = image.load_img("/content/flower.jpeg", target_size = (64,64))
    x = image.img_to_array(img)
    x = np.expand_dims(x,axis = 0)
    pred = model.predict(x)

    labels = ['daisy','dandelion','roses','sunflowers','tulips']
    print("Input Image is\n")
    img
```

Input Image is



```
[ ] print("Classification of Flower is:",labels[np.argmax(pred)])
```

Classification of Flower is: sunflowers