#Unzipping

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

#Image Augmentation

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

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

xtrain = train_gen.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,
Dense, Flatten
from keras.callbacks import EarlyStopping, ReduceLROnPlateau

model = Sequential()
model.add(Convolution2D(32,
(3,3),activation='relu',input_shape=(64,64,3)))
model.add(MaxPooling2D((2,2)))
model.add(Flatten())

model.add(Dense(400,activation='relu'))
model.add(Dense(200,activation='relu'))
model.add(Dense(100,activation='relu'))
model.add(Dense(5,activation='softmax'))
```

Compile Model

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

early_stopping = EarlyStopping(monitor='accuracy',
                        patience=3)
reduce_lr = ReduceLROnPlateau(monitor='accuracy',
                        patience=5,
                        factor=0.5,min_lr=0.00001)

callback = [reduce_lr,early_stopping]
```

Fit Model

```
model.fit_generator(xtrain,
                    steps_per_epoch = len(xtrain),
                    callbacks=callback,
                    epochs=100)
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:4:
UserWarning: `Model.fit_generator` is deprecated and will be removed
in a future version. Please use `Model.fit`, which supports
generators.
  after removing the cwd from sys.path.

Epoch 1/100
44/44 [==============================] - 31s 703ms/step - loss: 0.6074
- accuracy: 0.7751 - lr: 0.0010
Epoch 2/100
44/44 [==============================] - 31s 702ms/step - loss: 0.5491
- accuracy: 0.7973 - lr: 0.0010
Epoch 3/100
44/44 [==============================] - 31s 696ms/step - loss: 0.5417
- accuracy: 0.8043 - lr: 0.0010
Epoch 4/100
44/44 [==============================] - 31s 693ms/step - loss: 0.4930
- accuracy: 0.8156 - lr: 0.0010
Epoch 5/100
44/44 [==============================] - 31s 692ms/step - loss: 0.4616
- accuracy: 0.8293 - lr: 0.0010
Epoch 6/100
44/44 [==============================] - 31s 695ms/step - loss: 0.4350
- accuracy: 0.8392 - lr: 0.0010
Epoch 7/100
44/44 [==============================] - 31s 700ms/step - loss: 0.4190
- accuracy: 0.8469 - lr: 0.0010
Epoch 8/100
44/44 [==============================] - 31s 692ms/step - loss: 0.3975
- accuracy: 0.8568 - lr: 0.0010
Epoch 9/100
44/44 [==============================] - 31s 689ms/step - loss: 0.4207
- accuracy: 0.8432 - lr: 0.0010
Epoch 10/100
44/44 [==============================] - 31s 696ms/step - loss: 0.3674
- accuracy: 0.8687 - lr: 0.0010
Epoch 11/100
44/44 [==============================] - 31s 689ms/step - loss: 0.3267
- accuracy: 0.8888 - lr: 0.0010
Epoch 12/100
44/44 [==============================] - 31s 699ms/step - loss: 0.3255
- accuracy: 0.8877 - lr: 0.0010
Epoch 13/100
44/44 [==============================] - 31s 688ms/step - loss: 0.2975
```

```
- accuracy: 0.8999 - lr: 0.0010
Epoch 14/100
44/44 [==============================] - 31s 690ms/step - loss: 0.3144
- accuracy: 0.8927 - lr: 0.0010
Epoch 15/100
44/44 [==============================] - 31s 697ms/step - loss: 0.2544
- accuracy: 0.9120 - lr: 0.0010
Epoch 16/100
44/44 [==============================] - 31s 694ms/step - loss: 0.2986
- accuracy: 0.8939 - lr: 0.0010
Epoch 17/100
44/44 [==============================] - 31s 699ms/step - loss: 0.2570
- accuracy: 0.9097 - lr: 0.0010
Epoch 18/100
44/44 [==============================] - 31s 691ms/step - loss: 0.2282
- accuracy: 0.9205 - lr: 0.0010
Epoch 19/100
44/44 [==============================] - 31s 697ms/step - loss: 0.2180
- accuracy: 0.9226 - lr: 0.0010
Epoch 20/100
44/44 [==============================] - 31s 694ms/step - loss: 0.1995
- accuracy: 0.9314 - lr: 0.0010
Epoch 21/100
44/44 [==============================] - 31s 690ms/step - loss: 0.1805
- accuracy: 0.9340 - lr: 0.0010
Epoch 22/100
44/44 [==============================] - 31s 697ms/step - loss: 0.1986
- accuracy: 0.9307 - lr: 0.0010
Epoch 23/100
44/44 [==============================] - 31s 693ms/step - loss: 0.2023
- accuracy: 0.9287 - lr: 0.0010
Epoch 24/100
44/44 [==============================] - 31s 695ms/step - loss: 0.1646
- accuracy: 0.9465 - lr: 0.0010
Epoch 25/100
44/44 [==============================] - 31s 693ms/step - loss: 0.1727
- accuracy: 0.9407 - lr: 0.0010
Epoch 26/100
44/44 [==============================] - 32s 719ms/step - loss: 0.1285
- accuracy: 0.9569 - lr: 0.0010
Epoch 27/100
44/44 [==============================] - 31s 703ms/step - loss: 0.1705
- accuracy: 0.9400 - lr: 0.0010
Epoch 28/100
44/44 [==============================] - 31s 709ms/step - loss: 0.1531
- accuracy: 0.9439 - lr: 0.0010
Epoch 29/100
44/44 [==============================] - 32s 711ms/step - loss: 0.1413
- accuracy: 0.9539 - lr: 0.0010
```

```
<keras.callbacks.History at 0x7efc457f6e50>
```

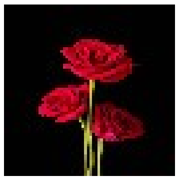
Save Model

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

#Test

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

```
img = image.load_img('/content/test image.jpg',target_size=(64,64))
img
```



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

```
array([[[1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.],
        ...,
        [1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.]],

       [[1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.],
        ...,
        [1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.]],

       [[1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.],
        ...,
        [1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.]],

       ...,

       [[1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.],
        ...,
        [1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.]],

       [[1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.],
        ...,
        [1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.]],

       [[1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.],
        ...,
        [1., 1., 1.],
        [1., 1., 1.],
        [1., 1., 1.]]], dtype=float32)
```

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

```
array([[[[1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.],
         ...,
         [1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.]],

        [[1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.],
         ...,
         [1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.]],

        [[1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.],
         ...,
         [1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.]],

        ...,
        [[1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.],
         ...,
         [1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.]],

        [[1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.],
         ...,
         [1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.]],

        [[1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.],
         ...,
         [1., 1., 1.],
         [1., 1., 1.],
         [1., 1., 1.]]]], dtype=float32)
```

```
val = list(xtrain.class_indices.keys())
val
```

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

```
val[np.argmax(model.predict(h))]
```

{"type":"string"}