Download the Dataset

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

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.m
```

Unzip the Dataset

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

```
Archive:  /content/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_e7f4008c03.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/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_aaa9cdfe78_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: flowers/daisy/12601254324_3cb62c254a_m.jpg
 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
```

Image Augmentation

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

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

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

```
x_train=train_datagen.flow_from_directory(r"/content/flowers",target_size=(64,64),class_mo
```

```
Found 8634 images belonging to 6 classes.
```

```
x_test=test_datagen.flow_from_directory(r"/content/flowers",target_size=(64,64),class_mode
```

```
Found 8634 images belonging to 6 classes.
```

```
x_train.class_indices
```

```
{'daisy': 0,
 'dandelion': 1,
 'flowers': 2,
 'rose': 3,
 'sunflower': 4,
 'tulip': 5}
```

Create Model

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

```
model=Sequential()
```

Add Layers

Convolution

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

MaxPooling

```
model.add(MaxPooling2D(pool_size=(2,2)))
```

Flatten

```
model.add(Flatten())
```

```
model.summary()
```

```
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 62, 62, 32)        896

 conv2d_1 (Conv2D)           (None, 60, 60, 32)        9248

 max_pooling2d (MaxPooling2D  (None, 30, 30, 32)       0
 )

 flatten (Flatten)           (None, 28800)             0

=================================================================
Total params: 10,144
Trainable params: 10,144
Non-trainable params: 0
_________________________________________________________________
```

```
32*(3*3*3+1)
```

```
896
```

Hidden Layers

```
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))
```

Output

```
model.add(Dense(4,activation='softmax'))
```

Compile The Model

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

```
len(x_train)
```

```
360
```

```
8634/24
```

```
359.75
```

Fit The Model

```
model.fit
```

```
<bound method Model.fit of <keras.engine.sequential.Sequential object at
0x7f1116f22250>>
```

Save The Model

```
ls
```

```
daisy/  dandelion/  flowers/  rose/  sunflower/  tulip/
```

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

```
ls
```

```
daisy/  dandelion/  flowers/  flowers.h5  rose/  sunflower/  tulip/
```

Test The Model

```
import numpy as np
```

```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image


model=load_model('flowers.h5')


img=image.load_img(r"/content/flowers/flowers/rose/10090824183_d02c613f10_m.jpg")


img
```

```
img=image.load_img(r"/content/flowers/flowers/rose/10090824183_d02c613f10_m.jpg",target_si
img
```

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

```
array([[[120., 120., 108.],
        [ 97.,  87.,  88.],
        [109.,  99.,  98.],
        ...,
        [124., 136., 114.],
        [163., 172., 153.],
        [138., 143., 121.]],

       [[ 95.,  88.,  96.],
        [ 68.,  48.,  73.],
        [ 89.,  75.,  90.],
        ...,
        [132., 146., 133.],
        [112., 121., 104.],
        [113., 125., 105.]],

       [[ 89.,  76.,  94.],
        [ 83.,  70.,  87.],
        [ 83.,  77.,  87.],
        ...,
```

```
        [105., 104.,  99.],
        [112., 121., 104.],
        [105., 111.,  97.]],

       ...,

       [[ 22.,   7.,  38.],
        [ 23.,   8.,  39.],
        [ 22.,   3.,  31.],
        ...,
        [ 39.,  16.,  70.],
        [ 46.,  21.,  79.],
        [ 47.,  21.,  82.]],

       [[ 26.,  11.,  40.],
        [ 23.,   8.,  37.],
        [ 24.,  15.,  44.],
        ...,
        [ 38.,  17.,  73.],
        [ 42.,  18.,  76.],
        [ 45.,  19.,  80.]],

       [[ 24.,   8.,  37.],
        [ 26.,  10.,  39.],
        [ 26.,   2.,  34.],
        ...,
        [ 48.,  19.,  77.],
        [ 52.,  22.,  82.],
        [ 52.,  24.,  85.]]], dtype=float32)
```

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

```
array([[[[120., 120., 108.],
         [ 97.,  87.,  88.],
         [109.,  99.,  98.],
         ...,
         [124., 136., 114.],
         [163., 172., 153.],
         [138., 143., 121.]],

        [[ 95.,  88.,  96.],
         [ 68.,  48.,  73.],
         [ 89.,  75.,  90.],
         ...,
         [132., 146., 133.],
         [112., 121., 104.],
         [113., 125., 105.]],

        [[ 89.,  76.,  94.],
         [ 83.,  70.,  87.],
         [ 83.,  77.,  87.],
         ...,
         [105., 104.,  99.],
         [112., 121., 104.],
         [105., 111.,  97.]],

        ...,
```

```
               [[ 22.,   7.,  38.],
                [ 23.,   8.,  39.],
                [ 22.,   3.,  31.],
                ...,
                [ 39.,  16.,  70.],
                [ 46.,  21.,  79.],
                [ 47.,  21.,  82.]],

               [[ 26.,  11.,  40.],
                [ 23.,   8.,  37.],
                [ 24.,  15.,  44.],
                ...,
                [ 38.,  17.,  73.],
                [ 42.,  18.,  76.],
                [ 45.,  19.,  80.]],

               [[ 24.,   8.,  37.],
                [ 26.,  10.,  39.],
                [ 26.,   2.,  34.],
                ...,
                [ 48.,  19.,  77.],
                [ 52.,  22.,  82.],
                [ 52.,  24.,  85.]]]], dtype=float32)
```

```
y=np.argmax(model.predict(x),axis=1)
```

```
y
```

```
array([[[41, 41, 41],
        [43, 43, 41],
        [44, 44, 44],
        [39, 39, 48],
        [34, 49, 49],
        [42, 54, 54],
        [41, 60, 55],
        [54, 54, 53],
        [39, 39, 39],
        [60, 60, 60],
        [60, 61, 61],
        [41, 41, 41],
        [30, 30, 30],
        [30, 30, 33],
        [31, 32, 32],
        [55, 32, 55],
        [33, 32, 33],
        [32,  5, 31],
        [32, 31, 31],
        [31, 13, 15],
        [20, 20, 20],
        [30, 30, 18],
        [28, 10, 12],
        [27, 10, 10],
        [40, 40, 40],
        [45, 45, 16],
        [28, 28, 10],
        [28, 28, 26],
        [28, 28, 27],
        [28, 28, 28],
```

```
               [63, 61, 61],
               [56, 56, 60],
               [61, 61, 61],
               [61, 59, 61],
               [57, 57, 57],
               [57, 57, 57],
               [55, 55, 52],
               [54, 54, 59],
               [54, 54, 54],
               [54, 54, 54],
               [54, 54, 54],
               [19, 20, 20],
               [31, 31, 31],
               [16, 16, 16],
               [32, 17, 17],
               [57, 15, 15],
               [56, 10, 10],
               [54, 54, 54],
               [53, 56, 58],
               [50, 55, 59],
               [43, 43, 51],
               [53, 57, 38],
               [51, 44, 44],
               [38, 48, 56],
               [37, 57, 57],
               [60, 56, 43],
               [44, 57, 60],
               [41, 41, 57],
```

```
x_train.class_indices
```

```
{'daisy': 0,
 'dandelion': 1,
 'flowers': 2,
 'rose': 3,
 'sunflower': 4,
 'tulip': 5}
```

```
index=['daisy','dandelion','flowers','rose','sunflower','tulip']
```

```
img=image.load_img(r"/content/flowers/flowers/daisy/10172379554_b296050f82_n.jpg",target_s
img
```

Colab paid products - Cancel contracts here