Assignment -3

BUILD AN CNN MODEL FOR THE CLASSIFICATION OF FLOWERS

Assignment Date	10 October 2022
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Maximum Marks	2 Marks

Question-1:

DOWNLOAD THE DATA SET

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

```
!unzip '/content/Flowers-Dataset.zip'
  inflating: flowers/dandelion/5996421299_b9bf488c1a_n.jpg
  inflating: flowers/dandelion/6012046444_fd80afb63a_n.jpg
  inflating: flowers/dandelion/6019234426_d25ea1230a_m.jpg
  inflating: flowers/dandelion/6035460327_4bbb708eab_n.jpg
  inflating: flowers/dandelion/6044710875_0459796d1b_m.jpg
  inflating: flowers/dandelion/6060576850_984176cf4f_n.jpg
  inflating: flowers/dandelion/6103898045_e066cdeedf_n.jpg
  inflating: flowers/dandelion/6104442744_ee2bcd32e7_n.jpg
  inflating: flowers/dandelion/61242541_a04395e6bc.jpg
  inflating: flowers/dandelion/6132275522_ce46b33c33_m.jpg
  inflating: flowers/dandelion/6146107825_45f708ecd7_n.jpg
  inflating: flowers/dandelion/6208857436_14a65fe4af_n.jpg
  inflating: flowers/dandelion/62293290_2c463891ff_m.jpg
  inflating: flowers/dandelion/6229634119_af5fec0a22.jpg
  inflating: flowers/dandelion/6250363717_17732e992e_n.jpg
  inflating: flowers/dandelion/6400843175_ef07053f8f_m.jpg
  inflating: flowers/dandelion/6412422565_ce61ca48a9_n.jpg
  inflating: flowers/dandelion/645330051_06b192b7e1.jpg
  inflating: flowers/dandelion/6495802659_98b57e0cca_m.jpg
  inflating: flowers/dandelion/674407101_57676c40fb.jpg
  inflating: flowers/dandelion/6888894675_524a6accab_n.jpg
  inflating: flowers/dandelion/6897671808_57230e04c5_n.jpg
  inflating: flowers/dandelion/6900157914_c3387c11d8.jpg
  inflating: flowers/dandelion/6901435398_b3192ff7f8_m.jpg
  inflating: flowers/dandelion/6918170172_3215766bf4_m.jpg
```

Question-2:

IMAGE AUGUMENTATION

Solution

```
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)
```

```
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)
xtrain
```

```
Found 4317 images belonging to 5 classes.
<keras.preprocessing.image.DirectoryIterator at 0x7f0656af6fd0>
```

Question-3:

CREATE MODEL

Solution

from tensorflow.keras.models import Sequential

from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense

Question-4:

ADD LAYERS (CONVOLUTION,MAX POOLING ,FLATTEN, DENSE(HIDDEN LAYERS) ,OUTPUT)

Solution

```
# Flatten layer
model = Sequential()
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3))) # Convolution layer
model.add(MaxPooling2D(pool_size=(2,2))) # Max pooling layer
model.add(Flatten())
```

```
model = Sequential()
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3))) # Convolution layer
model.add(MaxPooling2D(pool_size=(2,2))) # Max pooling layer
model.add(Flatten()) # Flatten layer
model
```

```
<keras.engine.sequential.Sequential at 0x7f0657db3710>
```

```
# Dense layers
model.add(Dense(300,activation='relu')) # Hidden layer
model.add(Dense(150,activation='relu')) # Hidden layer
model.add(Dense(5,activation='softmax')) # Output layer
```

```
[17] model.add(Dense(300,activation='relu')) # Hidden layer
     model.add(Dense(150,activation='relu')) # Hidden layer
     model.add(Dense(5,activation='softmax')) # Output layer

     <keras.engine.sequential.Sequential at 0x7f0657db3710>
```

Question-5:

COMPILE THE MODEL

Solution

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

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

Question-6:

FIT THE MODEL

Solution

```
model.fit(xtrain,
      steps_per_epoch=len(xtrain),
      epochs=10,
      )
```

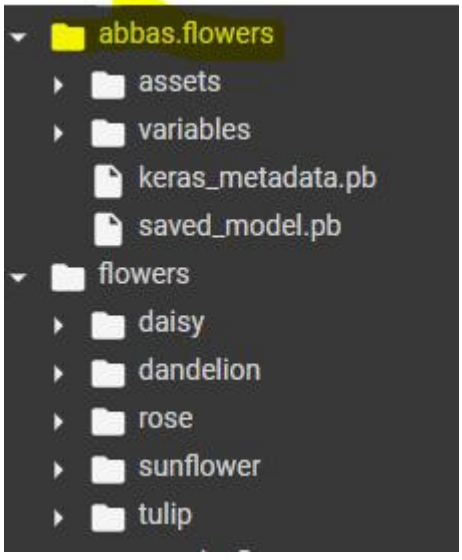
```
model.fit(xtrain,
          steps_per_epoch=len(xtrain),
          epochs=10,
          )

Epoch 1/10
44/44 [==============================] - 22s 292ms/step - loss: 1.6018 - accuracy: 0.2402
Epoch 2/10
44/44 [==============================] - 13s 303ms/step - loss: 1.6017 - accuracy: 0.2402
Epoch 3/10
44/44 [==============================] - 13s 301ms/step - loss: 1.5998 - accuracy: 0.2437
Epoch 4/10
44/44 [==============================] - 13s 300ms/step - loss: 1.5997 - accuracy: 0.2423
Epoch 5/10
44/44 [==============================] - 13s 304ms/step - loss: 1.6005 - accuracy: 0.2439
Epoch 6/10
44/44 [==============================] - 13s 301ms/step - loss: 1.5993 - accuracy: 0.2349
Epoch 7/10
44/44 [==============================] - 13s 302ms/step - loss: 1.6001 - accuracy: 0.2309
Epoch 8/10
44/44 [==============================] - 13s 303ms/step - loss: 1.5996 - accuracy: 0.2437
Epoch 9/10
44/44 [==============================] - 13s 298ms/step - loss: 1.5996 - accuracy: 0.2437
Epoch 10/10
44/44 [==============================] - 13s 301ms/step - loss: 1.5996 - accuracy: 0.2437
<keras.callbacks.History at 0x7f0640358550>
```

Question-7:

SAVE THE MODEL

Solution

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

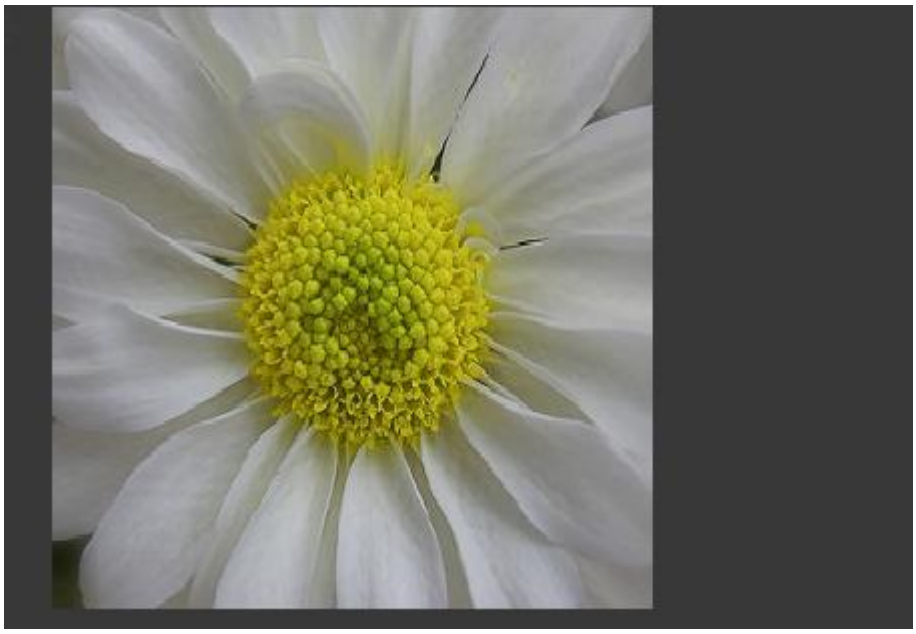


Question-8:

TEST THE MODEL

Solution

```
import numpy as np

from tensorflow.keras.preprocessing import image

img =image.load_img('/content/flowers/daisy/100080576_f52e8ee070_n.jpg',target_size=(300,300))

img
```

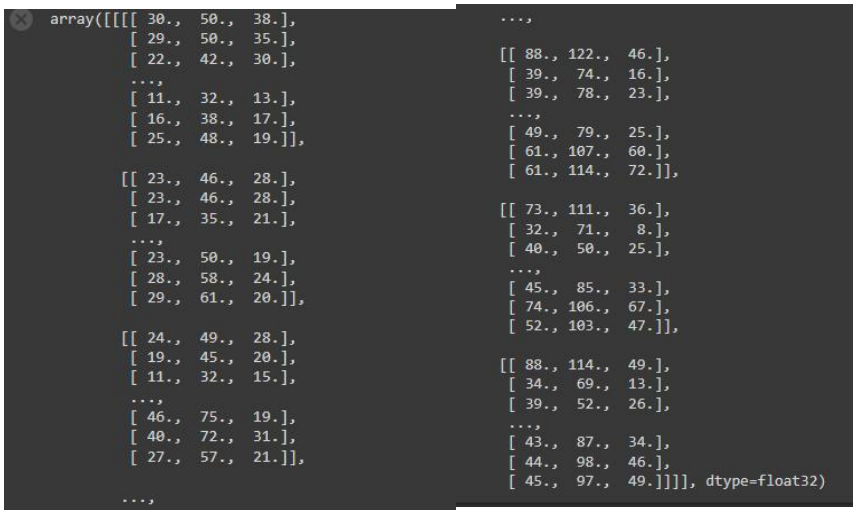


```
x = image.img_to_array(img)

X
```

```
array([[[135., 135., 133.],
        [138., 138., 136.],
        [142., 142., 142.],
        ...,
        [153., 153., 153.],
        [156., 156., 156.],
        [148., 148., 148.]],

       [[134., 134., 132.],
        [137., 137., 135.],
        [141., 141., 139.],
        ...,
        [153., 153., 153.],
        [156., 156., 156.],
        [148., 148., 148.]],

       [[133., 133., 131.],
        [136., 136., 134.],
        [141., 141., 139.],
        ...,
        [153., 153., 153.],
        [155., 155., 155.],
        [146., 146., 146.]],

       ...,
```

```
...,

[[ 45.,  48.,  27.],
 [ 44.,  47.,  26.],
 [ 44.,  47.,  26.],
 ...,
 [130., 126., 125.],
 [130., 126., 125.],
 [129., 125., 124.]],

[[ 44.,  47.,  26.],
 [ 44.,  47.,  26.],
 [ 44.,  47.,  26.],
 ...,
 [130., 126., 125.],
 [130., 126., 125.],
 [130., 126., 125.]],

[[ 44.,  47.,  26.],
 [ 44.,  47.,  26.],
 [ 44.,  47.,  26.],
 ...,
 [132., 128., 127.],
 [132., 128., 127.],
 [132., 128., 127.]]], dtype=float32)
```

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

X
```

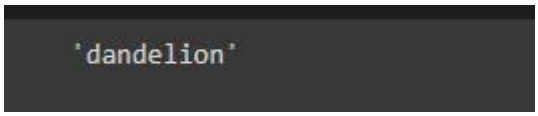


```
array([[[[ 30.,  50.,  38.],
         [ 29.,  50.,  35.],
         [ 22.,  42.,  30.],
         ...,
         [ 11.,  32.,  13.],
         [ 16.,  38.,  17.],
         [ 25.,  48.,  19.]],

        [[ 23.,  46.,  28.],
         [ 23.,  46.,  28.],
         [ 17.,  35.,  21.],
         ...,
         [ 23.,  50.,  19.],
         [ 28.,  58.,  24.],
         [ 29.,  61.,  20.]],

        [[ 24.,  49.,  28.],
         [ 19.,  45.,  20.],
         [ 11.,  32.,  15.],
         ...,
         [ 46.,  75.,  19.],
         [ 40.,  72.,  31.],
         [ 27.,  57.,  21.]],

        ...,

        ...,

        [[ 88., 122.,  46.],
         [ 39.,  74.,  16.],
         [ 39.,  78.,  23.],
         ...,
         [ 49.,  79.,  25.],
         [ 61., 107.,  60.],
         [ 61., 114.,  72.]],

        [[ 73., 111.,  36.],
         [ 32.,  71.,   8.],
         [ 40.,  50.,  25.],
         ...,
         [ 45.,  85.,  33.],
         [ 74., 106.,  67.],
         [ 52., 103.,  47.]],

        [[ 88., 114.,  49.],
         [ 34.,  69.,  13.],
         [ 39.,  52.,  26.],
         ...,
         [ 43.,  87.,  34.],
         [ 44.,  98.,  46.],
         [ 45.,  97.,  49.]]], dtype=float32)
```

xtrain.class_indices

```
xtrain.class_indices

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

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



```
'dandelion'
```

Img=image.load_img('/content/flowers/daisy/144603918_b9de002f60_m.jpg',target_size=(300,300))
img

```
img = image.load_img('/content/flowers/daisy/
img
```