Assignment -3

BUILD AN CNN MODEL FOR THE CLASSIFICATION OF FLOWERS

Assignment Date	10 October 2022
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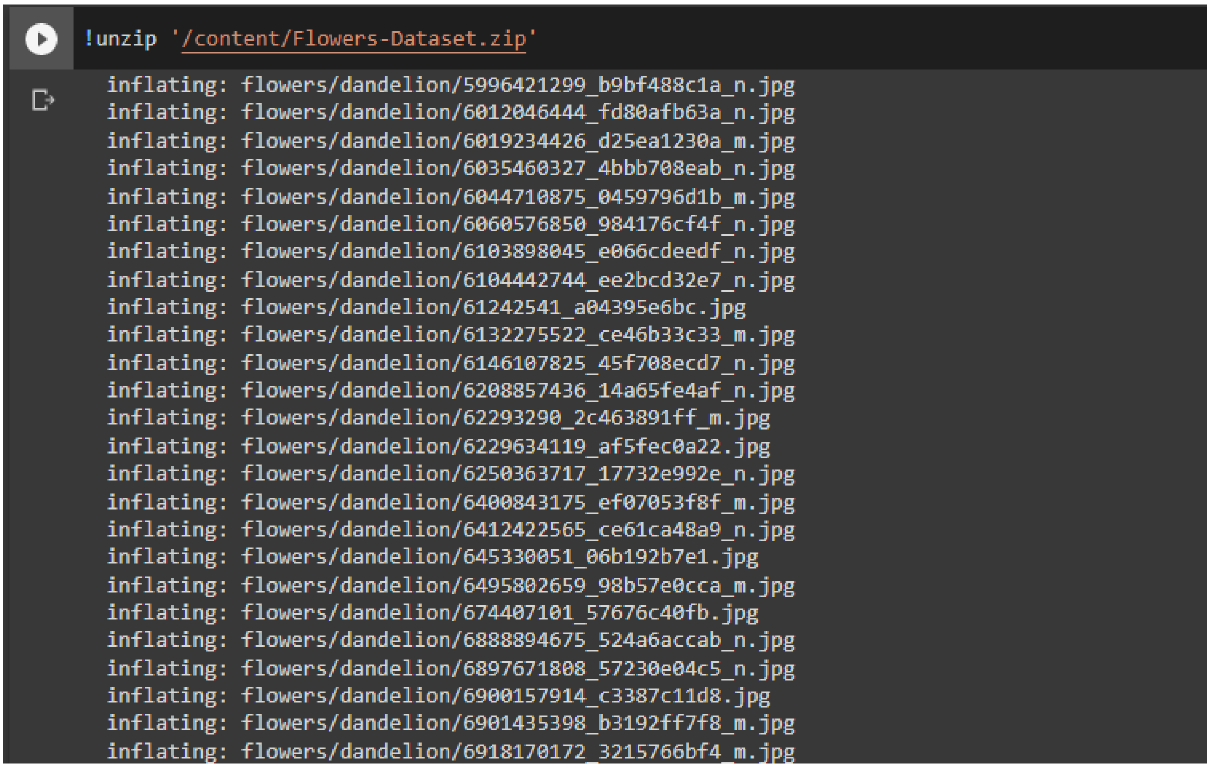
Student Roll Number	913319104034
Maximum Marks	2 Marks

Question-1:

DOWNLOAD THE DATA SET

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



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

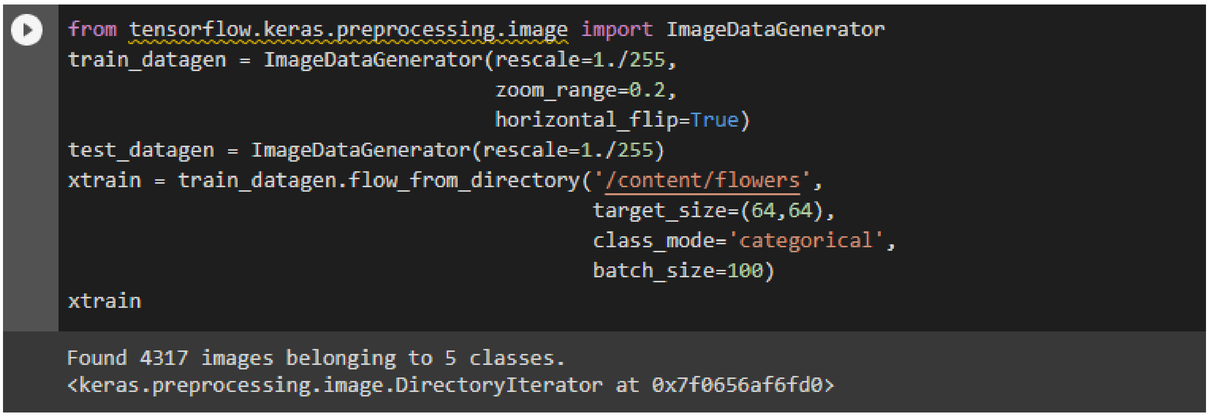
```
  inflating: flowers/dandelion/5996421299_b9bf488c1a_n.jpg
  inflating: flowers/dandelion/6012046444_fd80afb63a_n.jpg
  inflating: flowers/dandelion/6019234426_d25ea1230a_m.jpg
  inflating: flowers/dandelion/6035460327_4bbb708eab_n.jpg
  inflating: flowers/dandelion/6044710875_0459796d1b_m.jpg
  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

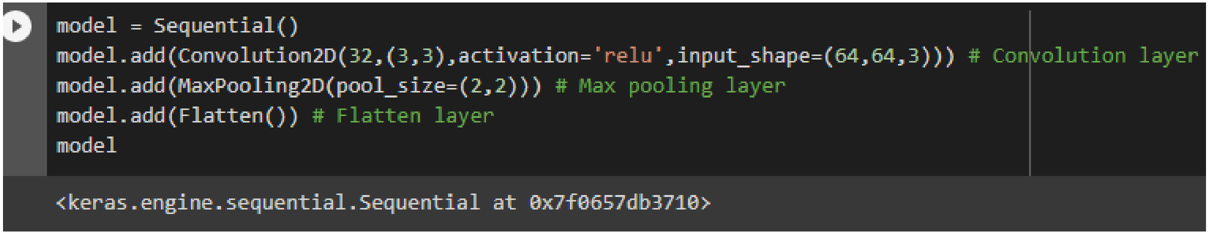
# Flatten layer

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
```

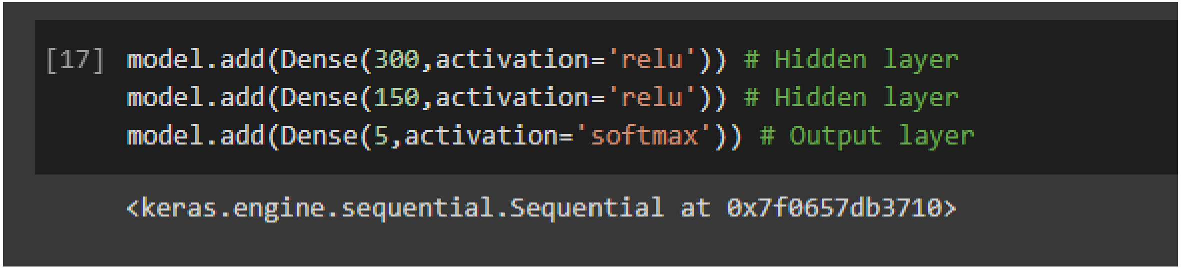
```
<keras.engine.sequential.Sequential at 0x7f0657db3710>
```

# 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
```

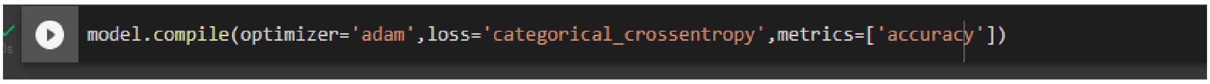
```
<keras.engine.sequential.Sequential at 0x7f0657db3710>
```

Question-5:

COMPILE THE MODEL

Solution

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



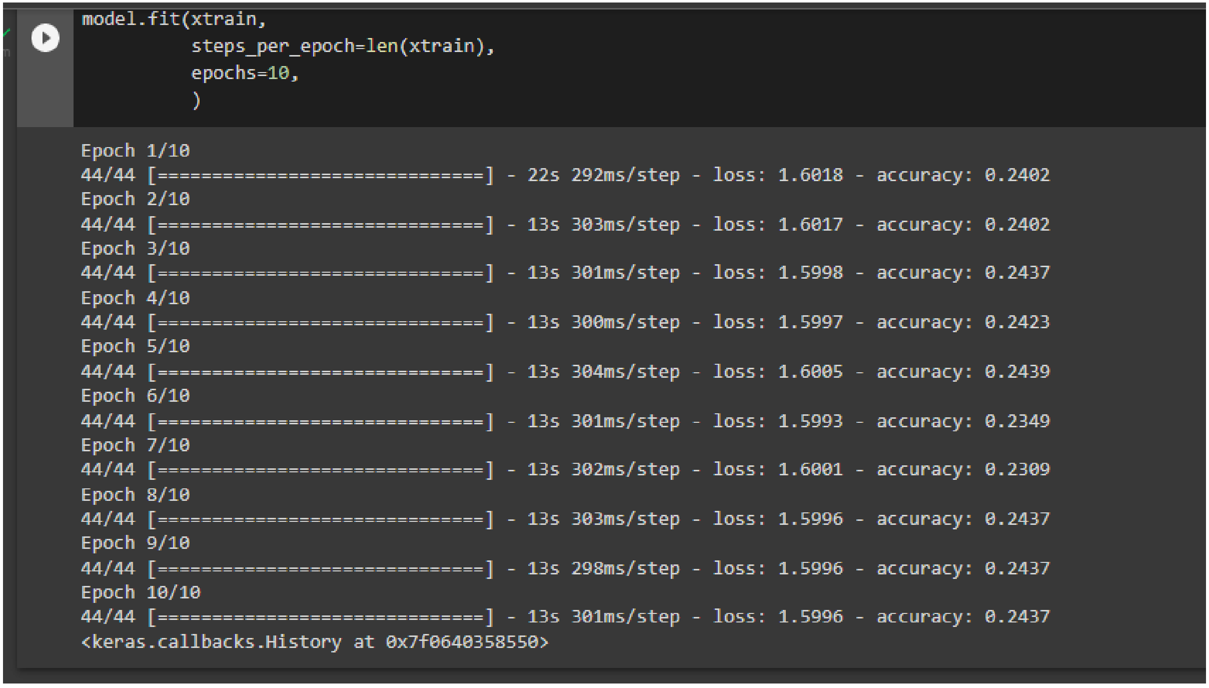
```
model.compile(optimizer='adam',loss='categorical_crossentropy',metrics=['accuracy'])
```

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,
          )
```

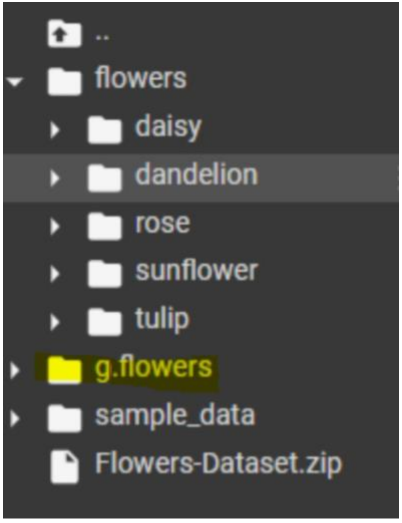
```
Epoch 1/10
44/44 [==============================] - 22s 292ms/step - loss: 1.6018 - accuracy: 0.2402
Epoch 2/10
44/44 [==============================] - 13s 303ms/step - loss: 1.6017 - accuracy: 0.2402
Epoch 3/10
44/44 [==============================] - 13s 301ms/step - loss: 1.5998 - accuracy: 0.2437
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('g.flowers')
```



Question-8:

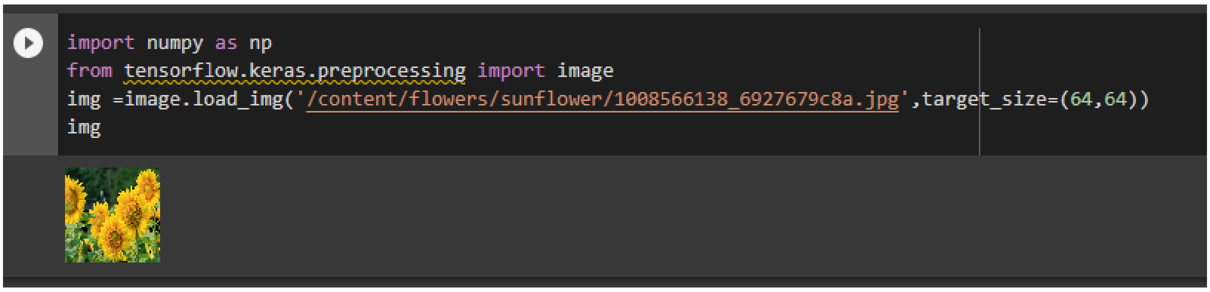
TEST THE MODEL

Solution

import numpy as np

from tensorflow.keras.preprocessing import image

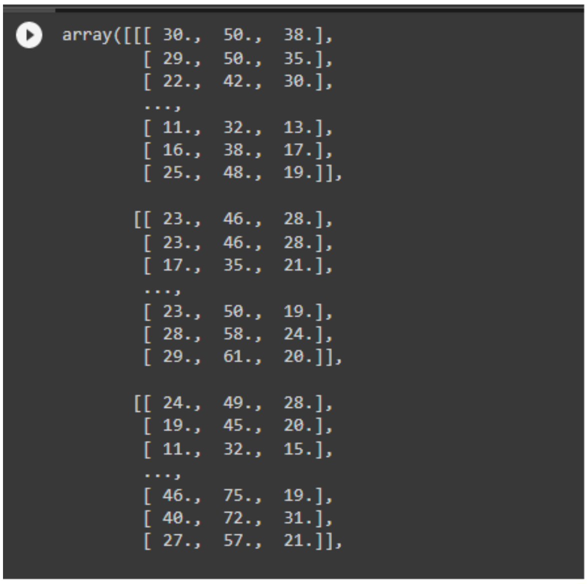
img=image.load_img('/content/flowers/sunflower/1008566138_6927679c8a.jpg',target_size=(64,64)Img



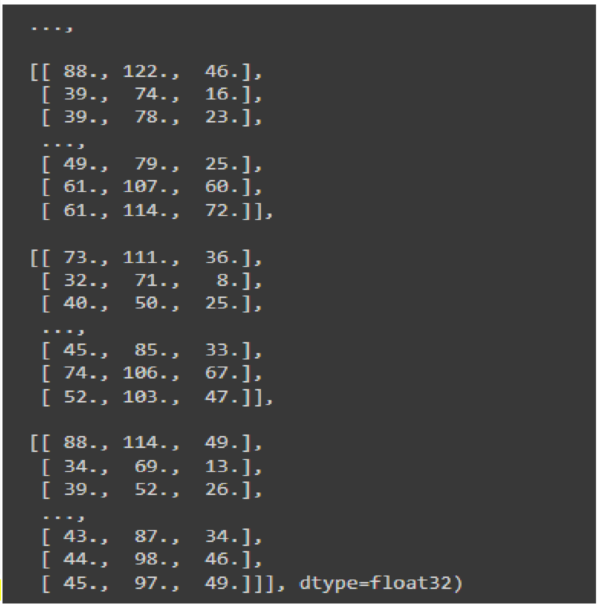
```
import numpy as np
from tensorflow.keras.preprocessing import image
img =image.load_img('/content/flowers/sunflower/1008566138_6927679c8a.jpg',target_size=(64,64))
img
```

x = image.img_to_array(img)

X



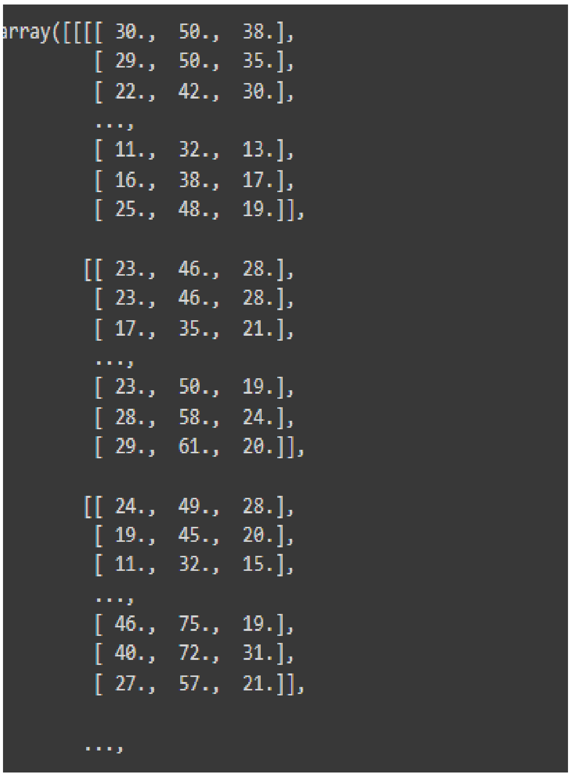
```
array([[[ 30.,  50.,  38.],
        [ 29.,  50.,  35.],
        [ 22.,  42.,  30.],
        ...,
        [ 11.,  32.,  13.],
        [ 16.,  38.,  17.],
        [ 25.,  48.,  19.]],

       [[ 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.]],
```



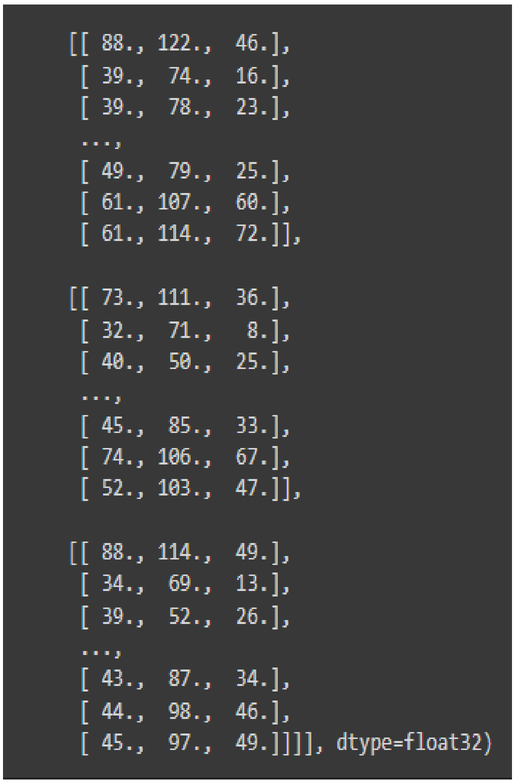
```
       ...,

       [[ 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)
```

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

X

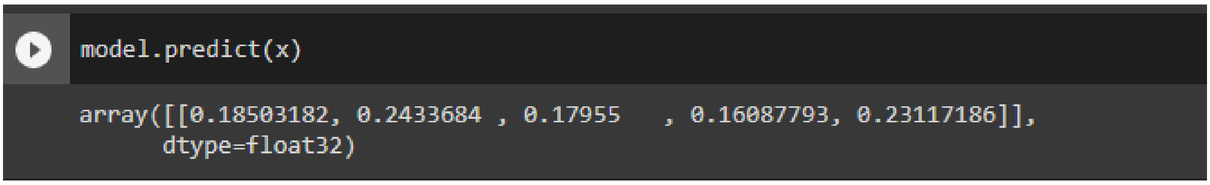


```
rray([[[[ 30.,  50.,  38.],
         [ 29.,  50.,  35.],
         [ 22.,  42.,  30.],
         ...,
         [ 11.,  32.,  13.],
         [ 16.,  38.,  17.],
         [ 25.,  48.,  19.]],

        [[ 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)
```

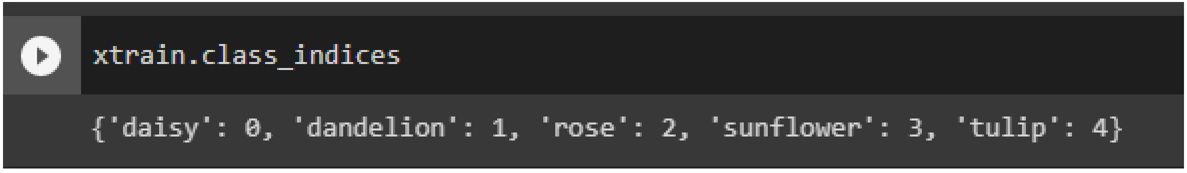
model.predict(x)



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

```
array([[0.18503182, 0.2433684 , 0.17955   , 0.16087793, 0.23117186]],
      dtype=float32)
```

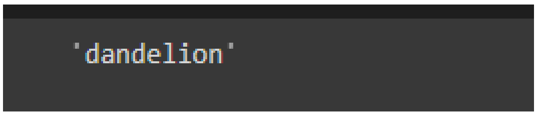
xtrain.class_indices



```
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/sunflower/1022552002_2b93faf9e7_n.jpg',target_size=(500,500)
Img

2s