

Assignment -3

Assignment Date	14 october 2022
Student Name	Vishnu Varthini P
Student Roll Number	310819104094
Maximum Marks	2 Marks

PDF LINK: [vishnuvarthini_assignment3.pdf](#)

In []:

In []:

```
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).

In []:

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

Archive: /content/drive/MyDrive/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
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inflating: flowers/daisy/107592979_aaa9cdfc78_m.jpg
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inflating: flowers/daisy/15327813273_06cdf42210.jpg

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inflating: flowers/sunflower/12471290635_1f9e3aae16_n.jpg
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inflating: flowers/tulip/14067476586_36bcdff111.jpg
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inflating: flowers/tulip/14068295074_cd8b85bffa.jpg
inflating: flowers/tulip/14068348874_7b36c99f6a.jpg
inflating: flowers/tulip/14068378204_7b26baa30d_n.jpg
inflating: flowers/tulip/14069837979_5f2d5fec55_n.jpg
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inflating: flowers/tulip/14069841878_f3ac9d788d_n.jpg
inflating: flowers/tulip/14069841968_fdc9c1d3a4_n.jpg

Image augmentation

```
In [ ]:
```

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

```
In [ ]:
```

```
train_data_aug = ImageDataGenerator(rescale=1./255, zoom_range=0.2, horizontal_flip=True)
```

```
In [ ]:
```

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

```
In [ ]:
```

```
xtrain = train_data_aug.flow_from_directory('/content/flowers', target_size=(64,64), class_mode='categorical', batch_size=100)
```

Found 4317 images belonging to 5 classes.

```
In [ ]:
```

```
xtest = test_data_aug.flow_from_directory('/content/flowers', target_size=(64,64), class_mode='categorical', batch_size=100)
```

Found 4317 images belonging to 5 classes.

Create Model

```
In [ ]:
```

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

Add Layers (Convolution, Max-Pooling, Flatten, Dense-(Hidden Layers), Output)

```
In [ ]:
```

```
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
# Fully connected layers (ANN)
model.add(Dense(300, activation='relu')) # Hidden layer 1
model.add(Dense(150, activation='relu')) # Hidden layer 2
model.add(Dense(5, activation='softmax')) # Output layer
```

Compile the Model

Compile the Model

```
In [ ]:
```

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

Fit the Model

```
In [ ]:
```

```
model.fit_generator(xtrain,
                    steps_per_epoch=len(xtrain),
                    epochs=10,
                    validation_data=xtest,
                    validation_steps=len(xtest))
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:5: UserWarning: `Model.fit_generator` is deprecated and will be removed in a future version. Please use `Model.fit`, which supports generators.
"""
```

```
Epoch 1/10
44/44 [=====] - 31s 501ms/step - loss: 1.5369 - accuracy: 0.3915
- val_loss: 1.3281 - val_accuracy: 0.4679
Epoch 2/10
44/44 [=====] - 22s 404ms/step - loss: 1.1927 - accuracy: 0.5444
```

```

44/44 [=====] - 31s 501ms/step - loss: 1.5369 - accuracy: 0.5919
- val_loss: 1.3281 - val_accuracy: 0.4679
Epoch 2/10
44/44 [=====] - 22s 494ms/step - loss: 1.1227 - accuracy: 0.5444
- val_loss: 1.1099 - val_accuracy: 0.5499
Epoch 3/10
44/44 [=====] - 22s 495ms/step - loss: 1.0530 - accuracy: 0.5907
- val_loss: 1.0295 - val_accuracy: 0.6057
Epoch 4/10
44/44 [=====] - 22s 495ms/step - loss: 0.9748 - accuracy: 0.6196
- val_loss: 0.9975 - val_accuracy: 0.6152
Epoch 5/10
44/44 [=====] - 22s 495ms/step - loss: 0.9246 - accuracy: 0.6407
- val_loss: 0.9888 - val_accuracy: 0.6187
Epoch 6/10
44/44 [=====] - 22s 495ms/step - loss: 0.9044 - accuracy: 0.6484
- val_loss: 0.8260 - val_accuracy: 0.6921
Epoch 7/10
44/44 [=====] - 23s 527ms/step - loss: 0.8398 - accuracy: 0.6822
- val_loss: 0.8739 - val_accuracy: 0.6699
Epoch 8/10
44/44 [=====] - 22s 495ms/step - loss: 0.8336 - accuracy: 0.6801
- val_loss: 0.8701 - val_accuracy: 0.6792
Epoch 9/10
44/44 [=====] - 21s 492ms/step - loss: 0.7707 - accuracy: 0.7088
- val_loss: 0.7902 - val_accuracy: 0.7023
Epoch 10/10
44/44 [=====] - 22s 496ms/step - loss: 0.7446 - accuracy: 0.7206
- val_loss: 0.8924 - val_accuracy: 0.6611

```

Out[]:

<keras.callbacks.History at 0x7fc678b91510>

Save the Model

In []:

```
model.save('/content/flowers')
```

WARNING:absl:Found untraced functions such as _jit_compiled_convolution_op while saving (showing 1 of 1). These functions will not be directly callable after loading.

Test the Model

Test the Model

In []:

```
import numpy as np
```

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

In []:

```
img = image.load_img('/content/flowers/tulip/8712282563_3819afb7bc.jpg', target_size=(64, 64))
```

In []:

```
img
```

Out[]:



In []:

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

Out[]:

```
array([[ 54.,  72.,  34.],
       [ 82.,  73.,  78.],
       [ 63.,  40.,  34.],
       ...,
       [ 63.,  76.,  69.],
       [ 93.,  84.,  75.],
       [ 97.,  64.,  45.],
       ...,
       [ 73.,  76.,  55.],
       [100., 100., 100.],
       [ 91.,  81.,  80.],
       ...,
       [ 50.,  81.,  47.]])
```

```

[[ 91.,  81.,  80.],
 ...,
 [ 50.,  81.,  47.],
 [184., 117., 171.],
 [160.,  85., 126.]],

[[ 79.,  75.,  72.],
 [ 89.,  89.,  87.],
 [ 84.,  65.,  61.],
 ...,
 [106.,  84.,  73.],
 [195., 105., 167.],
 [187., 103., 165.]],

...,

[[ 45.,  82.,  64.],
 [ 51.,  91.,  65.],
 [ 56.,  65.,  62.],
 ...,
 [ 40.,  81.,  13.],
 [ 53.,  93.,  30.],
 [ 68., 104.,  76.]],

[[ 48.,  87.,  69.],
 [ 48.,  94.,  57.],
 [ 68.,  67.,  72.],
 ...,
 [ 36.,  82.,  18.],
 [ 52.,  94.,  30.],
 [ 74., 112.,  65.]],

[[ 51.,  88.,  71.],
 [ 46.,  89.,  44.],
 [ 86.,  91.,  94.],
 ...,
 [ 40.,  84.,  25.],
 [ 47.,  93.,  31.],

[ 67., 108.,  50.]]], dtype=float32)

```

In []:

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

In []:

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

Out[]:

```

array([[[[ 54.,  72.,  34.],
 [ 82.,  73.,  78.],
 [ 63.,  40.,  34.],
 ...,
 [ 63.,  76.,  69.],
 [ 93.,  84.,  75.],
 [ 97.,  64.,  45.]],

[[ 73.,  76.,  55.],
 [100., 100., 100.],
 [ 91.,  81.,  80.],
 ...,
 [ 50.,  81.,  47.],
 [184., 117., 171.],
 [160.,  85., 126.]],

[[ 79.,  75.,  72.],
 [ 89.,  89.,  87.],
 [ 84.,  65.,  61.],
 ...,
 [106.,  84.,  73.],
 [195., 105., 167.],
 [187., 103., 165.]],

...,

[[ 45.,  82.,  64.],
 [ 51.,  91.,  65.],
 [ 56.,  65.,  62.],
 ...,
 [ 40.,  81.,  13.],
 [ 53.,  93.,  30.],
 [ 68., 104.,  76.]],

[[ 48.,  87.,  69.],
 [ 48.,  94.,  57.],
 [ 68.,  67.,  72.],
 ...,
 [ 36.,  82.,  18.],

```

```

...,
[ 36., 82., 18.],
[ 52., 94., 30.],
[ 74., 112., 65.]],

[[ 51., 88., 71.],
[ 46., 89., 44.],
[ 86., 91., 94.],
...,
[ 40., 84., 25.],
[ 47., 93., 31.],
[ 67., 108., 50.]]], dtype=float32)

```

In []:

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

1/1 [=====] - 0s 91ms/step

Out[]:

```
array([[0., 0., 0., 0., 1.]), dtype=float32)
```

In []:

```
xtrain.class_indices
```

Out[]:

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

In []:

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

1/1 [=====] - 0s 18ms/step

Out[]:

```
'tulip'
```

In []:

In []:

```
img = image.load_img('/content/flowers/tulip/8712282563_3819afb7bc.jpg',target_size=(64,64))
x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
pred = np.argmax(model.predict(x))
op[pred]
```

1/1 [=====] - 0s 15ms/step

Out[]:

```
'tulip'
```