**Assignment -3**

Build CNN Model for Classification of Flowers

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| Assignment Date | 29 September 2022 |
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| Student Roll Number | 910619104034 |
| Maximum Marks |  |

# 

# IMAGE AUGMENTATION

In [1]:

**import** numpy **as** np

**import** tensorflow **as** tf

**from** tensorflow.keras **import** layers

**from** tensorflow.keras.models **import** Sequential

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

**import** matplotlib.pyplot **as** plt batch\_size **=** 32

img\_height **=** 180

img\_width **=** 180

data\_dir **=** r"C:\Users\hp\tensorflow\Assignment 3\Dataset\Training"

In [2]:

train\_datagen **=** ImageDataGenerator(rescale **=** 1.**/**255, horizontal\_flip **= True**, vertical\_flip **= True**, zoom\_range **=** 0.2)

In [3]:

x\_train **=** train\_datagen**.**flow\_from\_directory(r'C:\Users\hp\tensorflow\Assignment 3\Dataset\Training',target\_size**=**(64,64),class\_mode**=**'categorical',batch\_size**=**100)

Found 4317 images belonging to 5 classes.

In [4]:

data\_augmentation **=** Sequential( [

layers**.**RandomFlip("vertical",input\_shape**=**(img\_height, img\_width, 3)), layers**.**RandomRotation(0.1),

layers**.**RandomZoom(0.1),

]

)

WARNING:tensorflow:Using a while\_loop for converting RngReadAndSkip cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting Bitcast cause there is no registered converter for this op.

WARNING:tensorflow:Using a while\_loop for converting Bitcast cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting StatelessRandomUniformV2 cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting ImageProjectiveTransformV3 cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting RngReadAndSkip cause there is no registered converter for this op.

WARNING:tensorflow:Using a while\_loop for converting Bitcast cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting Bitcast cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting StatelessRandomUniformV2 cause there is no registered converter for this op. WARNING:tensorflow:Using a while\_loop for converting ImageProjectiveTransformV3 cause there is no registered converter for this op.

# CREATING MODEL

In [5]:

**from** tensorflow.keras.layers **import** Convolution2D,MaxPooling2D,Flatten,Dense model **=** Sequential()

In [6]:

training\_ds **=** tf**.**keras**.**utils**.**image\_dataset\_from\_directory( data\_dir,

validation\_split**=**0.2, subset**=**"training", seed**=**57,

image\_size**=**(img\_height, img\_width), batch\_size**=**batch\_size)

Found 4317 files belonging to 5 classes.

Using 3454 files for training.

In [7]:

validation\_ds **=** tf**.**keras**.**utils**.**image\_dataset\_from\_directory( data\_dir,

validation\_split**=**0.2, subset**=**"validation",

seed**=**107,

image\_size**=**(img\_height, img\_width), batch\_size**=**batch\_size)

Found 4317 files belonging to 5 classes.

Using 863 files for validation.

In [8]:

training\_ds**.**class\_names

Out[8]: ['daisy', 'dandelion', 'rose', 'sunflower', 'tulip']

In [9]:

plt**.**figure(figsize**=**(7, 7))

**for** data, labels **in** training\_ds**.**take(1):

**for** i **in** range(6):

ax **=** plt**.**subplot(2, 3, i **+** 1) plt**.**imshow(data[i]**.**numpy()**.**astype("uint8")) plt**.**title(training\_ds**.**class\_names[labels[i]]) plt**.**axis("off")



# ADD LAYERS

CONVOLUTION LAYER

In [10]:

model**.**add(Convolution2D(32, (3,3), activation **=** "relu", input\_shape **=** (64,64,3) ))

# MAXPOOLING LAYER

In [11]:

model**.**add(MaxPooling2D(pool\_size **=** (2,2)))

# FLATTEN

In [12]:

model**.**add(Flatten())

# HIDDEN/DENSE LAYER

In [13]:

model**.**add(Dense(300, activation **=** "relu")) model**.**add(Dense(150, activation **=** "relu"))

# OUTPUT LAYER

In [14]:

model**.**add(Dense(5, activation **=** "softmax"))

# COMPILE THE MODEL

In [15]:

model**.**compile(optimizer**=**'adam',loss**=**'categorical\_crossentropy',metrics**=**['accuracy'])

# FIT THE MODEL

In [16]:

model**.**fit(x\_train, epochs **=** 15, steps\_per\_epoch **=** len(x\_train))

Epoch 1/15

44/44 [==============================] - 255s 6s/step - loss: 1.5912 - accuracy: 0.3678

Epoch 2/15

44/44 [==============================] - 153s 3s/step - loss: 1.1347 - accuracy: 0.5383

Epoch 3/15

44/44 [==============================] - 109s 2s/step - loss: 1.0550 - accuracy: 0.5791

Epoch 4/15

44/44 [==============================] - 69s 2s/step - loss: 0.9785 - accuracy: 0.6220

Epoch 5/15

44/44 [==============================] - 107s 2s/step - loss: 0.9251 - accuracy: 0.6412

Epoch 6/15

44/44 [==============================] - 53s 1s/step - loss: 0.8780 - accuracy: 0.6581

Epoch 7/15

44/44 [==============================] - 48s 1s/step - loss: 0.8600 - accuracy: 0.6620

Epoch 8/15

44/44 [==============================] - 34s 776ms/step - loss: 0.8493 - accuracy: 0.6785

Epoch 9/15

44/44 [==============================] - 36s 810ms/step - loss: 0.8076 - accuracy: 0.6894

Epoch 10/15

44/44 [==============================] - 36s 809ms/step - loss: 0.7879 - accuracy: 0.7019

Epoch 11/15

44/44 [==============================] - 52s 1s/step - loss: 0.7657 - accuracy: 0.7086

Epoch 12/15

44/44 [==============================] - 36s 819ms/step - loss: 0.7310 - accuracy: 0.7206

Epoch 13/15

44/44 [==============================] - 31s 711ms/step - loss: 0.7410 - accuracy: 0.7135

Epoch 14/15

44/44 [==============================] - 31s 699ms/step - loss: 0.7024 - accuracy: 0.7315

Epoch 15/15

44/44 [==============================] - 31s 692ms/step - loss: 0.6874 - accuracy: 0.7417

Out[16]: <keras.callbacks.History at 0x25c6755ad70>

# SAVE THE MODEL

In [17]:

model**.**save("flower.h1")

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. INFO:tensorflow:Assets written to: flower.h1\assets

INFO:tensorflow:Assets written to: flower.h1\assets

# TEST THE MODEL

In [18]:

**from** tensorflow.keras.models **import** load\_model

**from** tensorflow.keras.preprocessing **import** image

In [19]:

tulip\_img **=** image**.**load\_img(r'C:\Users\hp\tensorflow\Assignment 3\Dataset\Training\tulip\112428919\_f0c5ad7d9d\_n.jpg',target\_size**=**(64,64)) x **=** image**.**img\_to\_array(tulip\_img)

x **=** np**.**expand\_dims(x,axis**=**0) predicted\_class**=**model**.**predict(x)

1/1 [==============================] - 4s 4s/step

In [20]:

labels **=** ['daisy','dandelion','roses','sunflowers','tulips'] labels[np**.**argmax(predicted\_class)]

Out[20]: 'tulips'

In [21]:

tulip\_img

Out[21]: