Assignment -3

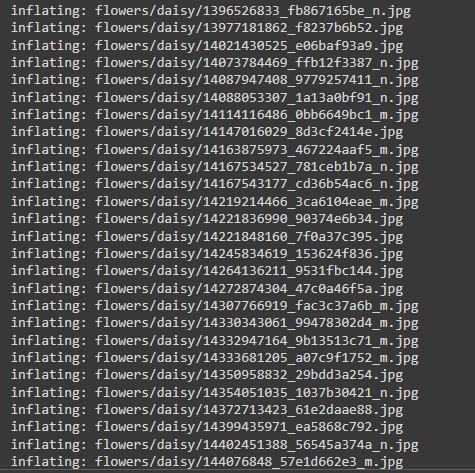
Build CNN model for classification of Flowers

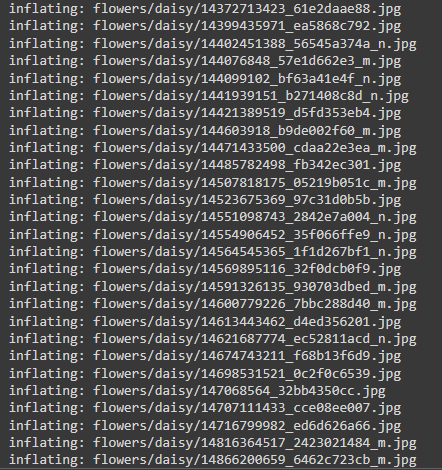
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| --- | --- |
| Assignment Date | 03 October 2022 |
| Team ID | PNT2022TMID07046 |
| Project Name | A Novel Method for Handwritten Digit  Recognition System |
| Student Name | Delicia R |
| Student Roll Number | 130719104016 |
| Maximum Marks | 2 Marks |

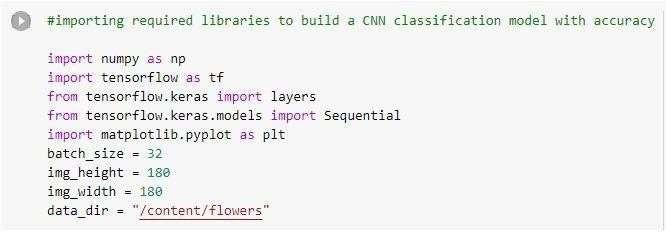
**Question-1.** Load the dataset

Solution:

unzip Flowers-Dataset.zip







**Question-2.** Image Augmentation

Solution:

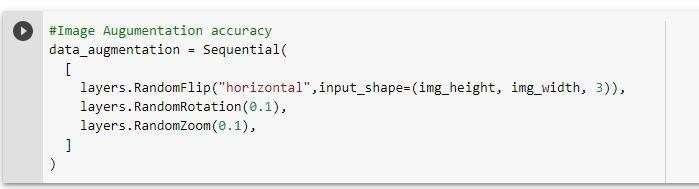
**from tensorflow.keras.preprocessing.image import ImageDataGenerator**

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

**x\_train = train\_datagen.flow\_from\_directory(r"/content/flowers", target\_size = (64,64) , class\_mode**

**= "categorical", batch\_size = 100)**





**Question-3.** Create model - Model Building and also Split dataset into training and testing sets

Solution:

from tensorflow.keras.models import Sequential

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

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

validation\_split=0.2, subset="training", seed=123,

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



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

validation\_split=0.2, subset="validation", seed=123,

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



class\_names = train\_ds.class\_names print(class\_names)



plt.figure(figsize=(10, 10))

for images, labels in train\_ds.take(1): for i in range(9):

ax = plt.subplot(3, 3, i + 1) plt.imshow(images[i].numpy().astype("uint8")) plt.title(class\_names[labels[i]])

plt.axis("off")



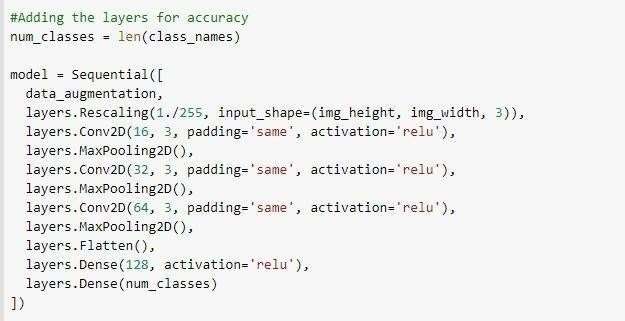
**Question-4.** Add the layers (Convolution,MaxPooling,Flatten,Dense-(HiddenLayers),Output)

Solution:

model.add(Convolution2D(32, (3,3), activation = "relu", input\_shape = (64,64,3) )) model.add(MaxPooling2D(pool\_size = (2,2)))

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

model.add(Dense(150, activation = "relu")) #mulitple dense layers model.add(Dense(5, activation = "softmax")) #output layer



**Question-5.** Compile The Model

Solution:

model.compile(loss = "categorical\_crossentropy", metrics = ["accuracy"], optimizer = "adam") len(x\_train)

***#Compile the model for further accuracy***

model.compile(optimizer='adam', loss=tf.keras.losses.SparseCategoricalCrossentropy(from\_logits=True), metrics=['accuracy'])

epochs=10

history = model.fit( train\_ds, validation\_data=val\_ds, epochs=epochs

)



***#To find the Training and Validation- Accuracy & Loss (Visualization)***

acc = history.history['accuracy']

val\_acc = history.history['val\_accuracy']

loss = history.history['loss'] val\_loss = history.history['val\_loss']

epochs\_range = range(epochs) plt.figure(figsize=(8, 8))

plt.subplot(1, 2, 1)

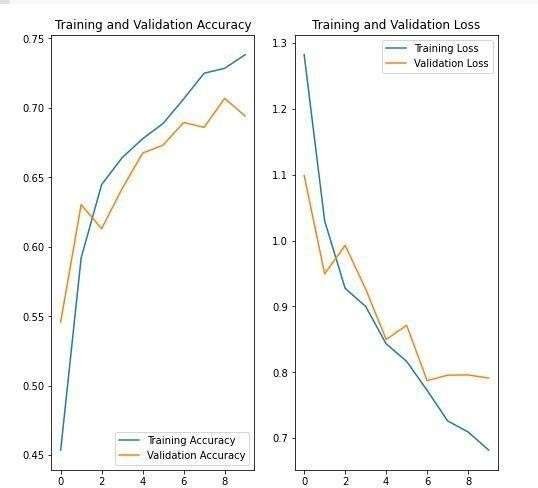
plt.plot(epochs\_range, acc, label='Training Accuracy') plt.plot(epochs\_range, val\_acc, label='Validation Accuracy') plt.legend(loc='lower right')

plt.title('Training and Validation Accuracy')

plt.subplot(1, 2, 2)

plt.plot(epochs\_range, loss, label='Training Loss') plt.plot(epochs\_range, val\_loss, label='Validation Loss') plt.legend(loc='upper right')

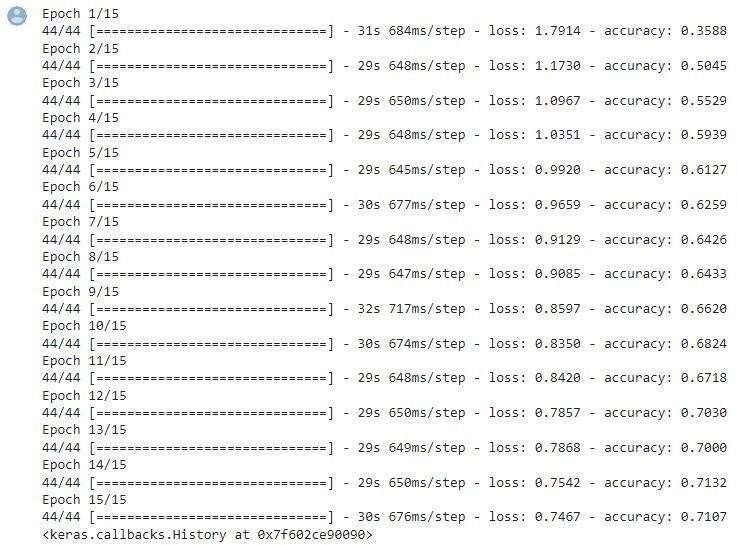
plt.title('Training and Validation Loss') plt.show()



**Question-6.** Fit The Model

Solution:

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



**Question-7.** Save The Model

Solution:

model.save("flowers.h1")

model.save("flowers.m5")#another model to show the accuracy

**Question-8.** Test The Model

Solution:

from tensorflow.keras.models import load\_model from tensorflow.keras.preprocessing import image import numpy as np

model = load\_model("/content/flowers.h1")

***# Testing with a random rose image from Google***

img = image.load\_img("/content/rose.gif", target\_size = (64,64) )

img



x = image.img\_to\_array(img) x.ndim

x = np.expand\_dims(x,axis = 0) x.ndim

pred = model.predict(x) pred



labels = ['daisy','dandelion','roses','sunflowers','tulips']

labels[np.argmax(pred)]



***#Testing the alternative model with accuracy***

sunflower\_url = "https://storage.googleapis.com/download.tensorflow.org/example\_images/592 px-Red\_sunflower.jpg"

sunflower\_path = tf.keras.utils.get\_file('Red\_sunflower', origin=sunflower\_url) img = tf.keras.utils.load\_img(

sunflower\_path, target\_size=(img\_height, img\_width)

)

img\_array = tf.keras.utils.img\_to\_array(img)

**img\_array = tf.expand\_dims(img\_array, 0) *# Create a batch***

predictions = model.predict(img\_array) score = tf.nn.softmax(predictions[0]) print(

"This image most likely belongs to {} with a {:.2f} percent confidence."

.format(class\_names[np.argmax(score)], 100 \* np.max(score))

)

