

Assignment –3

Build CNN for Classification of Flowers

Assignment Date	10 October 2022
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Maximum Marks	2 Marks

Import required packages

```
[ ] import keras

[ ] from google.colab import drive
drive.mount('/content/drive')

Mounted at /content/drive

[ ] from keras.preprocessing.image import ImageDataGenerator

[ ] train_datagen=ImageDataGenerator(rescale=1./255,
                                   shear_range=0.2,
                                   rotation_range=180,
                                   zoom_range=0.2,
                                   horizontal_flip=True)

test_dataGen=ImageDataGenerator(rescale=1./255)

[ ] #install Kaggle
!pip install -q kaggle

[ ] #create a kaggle folder
!mkdir ~/.kaggle

[ ] #copy the kaggle.json to folder created
!cp kaggle.json ~/.kaggle/
```

```
cp: cannot stat 'kaggle.json': No such file or directory

[ ] #permission for the json to act
! chmod 600 ~/.kaggle/kaggle.json

chmod: cannot access '/root/.kaggle/kaggle.json': No such file or directory
```

1. Download the dataset

```
[ ] x_train = train_datagen.flow_from_directory(r'/content/drive/MyDrive/IBM/train_set',
target_size = (128,128),
batch_size = 32,
class_mode = 'binary')

Found 2313 images belonging to 5 classes.

[ ] x_test = test_datagen.flow_from_directory(r'/content/drive/MyDrive/IBM/test_set',
target_size = (128,128),
batch_size = 32,
class_mode = 'binary')

Found 2068 images belonging to 5 classes.
```

2. Image Augmentation

```
[ ] #give any random image path

img = image.load_img(r'/content/drive/MyDrive/IBM/test_set/rose/10503217854_e66a804309.jpg')

x = image.img_to_array(img)

#expand the image shape

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

```
[ ] img
```



```
[ ] pip install imgaug
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: imgaug in /usr/local/lib/python3.7/dist-packages (0.4.0)
Requirement already satisfied: Pillow in /usr/local/lib/python3.7/dist-packages (from imgaug) (7.1.2)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.7/dist-packages (from imgaug) (3.2.2)
Requirement already satisfied: imageio in /usr/local/lib/python3.7/dist-packages (from imgaug) (2.9.0)
Requirement already satisfied: Shapely in /usr/local/lib/python3.7/dist-packages (from imgaug) (1.8.4)
Requirement already satisfied: opencv-python in /usr/local/lib/python3.7/dist-packages (from imgaug) (4.6.0.66)
Requirement already satisfied: six in /usr/local/lib/python3.7/dist-packages (from imgaug) (1.15.0)
Requirement already satisfied: scipy in /usr/local/lib/python3.7/dist-packages (from imgaug) (1.7.3)
Requirement already satisfied: scikit-image>=0.14.2 in /usr/local/lib/python3.7/dist-packages (from imgaug) (0.18.3)
Requirement already satisfied: numpy>=1.15 in /usr/local/lib/python3.7/dist-packages (from imgaug) (1.21.6)
Requirement already satisfied: tifffile>=2019.7.26 in /usr/local/lib/python3.7/dist-packages (from scikit-image>=0.14.2->imgaug) (2021.11.2)
Requirement already satisfied: PyWavelets>=1.1.1 in /usr/local/lib/python3.7/dist-packages (from scikit-image>=0.14.2->imgaug) (1.3.0)
Requirement already satisfied: networkx>=2.0 in /usr/local/lib/python3.7/dist-packages (from scikit-image>=0.14.2->imgaug) (2.6.3)
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib->imgaug) (2.8.2)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.7/dist-packages (from matplotlib->imgaug) (0.11.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib->imgaug) (1.4.4)
Requirement already satisfied: pyparsing>=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/lib/python3.7/dist-packages (from matplotlib->imgaug) (3.0.9)
Requirement already satisfied: typing-extensions in /usr/local/lib/python3.7/dist-packages (from kiwisolver->1.0.1->matplotlib->imgaug) (4.1.1)
```

```
[ ] pip install ipyplot

looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
collecting ipyplot
  Downloading ipyplot-1.1.1-py3-none-any.whl (13 kB)
Requirement already satisfied: pillow in /usr/local/lib/python3.7/dist-packages (from ipyplot) (7.1.2)
collecting shortuuid
  Downloading shortuuid-1.0.9-py3-none-any.whl (9.4 kB)
Requirement already satisfied: numpy in /usr/local/lib/python3.7/dist-packages (from ipyplot) (1.21.6)
Requirement already satisfied: IPython in /usr/local/lib/python3.7/dist-packages (from ipyplot) (7.9.0)
Requirement already satisfied: pickleshare in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (0.7.5)
Requirement already satisfied: pygments in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (2.6.1)
Requirement already satisfied: pexpect in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (4.8.0)
Requirement already satisfied: traitlets>=4.2 in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (5.1.1)
Requirement already satisfied: backcall in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (0.2.0)
Requirement already satisfied: decorator in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (4.4.2)
Requirement already satisfied: setuptools>=18.5 in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (57.4.0)
collecting jedi>=0.10
  Downloading jedi-0.18.1-py2.py3-none-any.whl (1.6 MB)
    | 1.6 MB 14.1 MB/s
Requirement already satisfied: prompt-toolkit<2.1.0,>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from IPython->ipyplot) (2.0.10)
Requirement already satisfied: parso<0.9.0,>=0.8.0 in /usr/local/lib/python3.7/dist-packages (from jedi->0.10->IPython->ipyplot) (0.8.3)
Requirement already satisfied: wcwidth in /usr/local/lib/python3.7/dist-packages (from prompt-toolkit<2.1.0,>=2.0.0->IPython->ipyplot) (0.2.5)
Requirement already satisfied: six>=1.9.0 in /usr/local/lib/python3.7/dist-packages (from prompt-toolkit<2.1.0,>=2.0.0->IPython->ipyplot) (1.15.0)
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.7/dist-packages (from pexpect->IPython->ipyplot) (0.7.0)
Installing collected packages: jedi, shortuuid, ipyplot
Successfully installed ipyplot-1.1.1 jedi-0.18.1 shortuuid-1.0.9
```

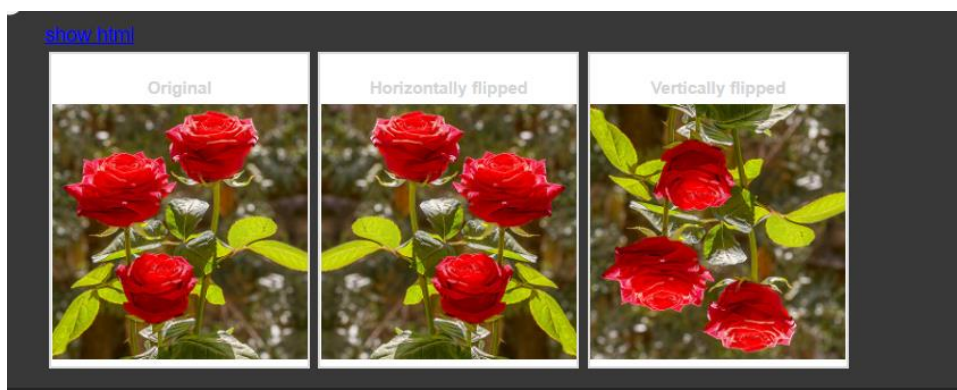
3.Create Model

```
[ ] import ipyplot
import imageio
import imgaug as ia
import imgaug.augmenters as iaa

[ ] input=imageio.imread("/content/drive/MyDrive/IBM/test_set/rose/12338444334_72fcc2fc58_m.jpg")

[ ] hflip = iaa.Fliplr(p=1.0)
input_hf = hflip.augment_image(input)

▶ vflip=iaa.Flipud (p=1.0)
input_vf=vflip.augment_image(input)
images_list=[input, input_hf, input_vf]
labels=['Original', 'Horizontally flipped', 'Vertically flipped']
ipyplot.plot_images (images_list,labels=labels, img_width=180)
```



```
[ ] crop1=iaa.Crop (percent=(0, 0.3))
input_crop1 = crop1.augment_image(input)
images_list=[input, input_crop1]
labels = ['Original', 'Cropped Image']
ipyplot.plot_images (images_list, labels=labels, img_width=180)
```

[show html](#)



```
[ ] noise=iaa.AdditiveGaussianNoise (18,48)
input_noise=noise.augment_image(input)
images_list=[input, input_noise]
labels= ["Original", "Gaussian Noise Image"]
ipyplot.plot_images(images_list, labels=labels, img_width=188)
```

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```
▶ rot1 = iaa.Affine(rotate=(-30,30))

input_rot1 = rot1.augment_image(input)
images_list=[input, input_rot1]
labels= ['Original', 'Rotated Image']
ipyplot.plot_images(images_list,labels=labels, img_width=180)
```

[show html](#)



4.Add Layers(Convolution, MaxPooling, Flatten,Dense-(Hidden Layers),Output)

```
[ ] #To define Linear intialisation import
    from keras.models import Sequential
    #To add Layers import Dense

    from keras.layers import Dense

    #To create Convolution kernel import Convolution2D from keras.layers import Convolution2D

    from keras.layers import Convolution2D

    from keras.layers import MaxPooling2D

    #import Flatten Layer

    from keras.layers import Flatten

    import warnings
    warnings.filterwarnings('ignore')

[ ] #initialize our model
    model = Sequential()

[ ] #Adding Convolutional Layer
    model.add(Convolution2D(32,(3,3),input_shape=(128,128,3),activation='relu'))
```

```
[ ] #Adding Pooling LayerMax Pooling
    model.add(MaxPooling2D(pool_size=(2,2)))

[ ] #Adding Flatten Layer
    model.add(Flatten())
```

Adding Hidden Layers

```
[ ] model.add(Dense(2,activation='relu'))

[ ] model.add(Dense(150, bias_initializer='uniform', activation='relu'))
```

Adding Output Layer

```
[ ] model.add(Dense (1, bias_initializer='uniform', activation='sigmoid'))
```

5.Compile the Model

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

6.Fit the Model

```
[ ] model.fit_generator(x_train,steps_per_epoch=14,  
                      epochs=10,validation_data=x_test,  
                      validation_steps=4)  
  
Epoch 1/10  
14/14 [=====] - 218s 16s/step - loss: 0.6122 - accuracy: 0.2723 - val_loss: 0.5923 - val_accuracy: 0.2500  
Epoch 2/10  
14/14 [=====] - 165s 12s/step - loss: 0.4433 - accuracy: 0.2500 - val_loss: 0.3061 - val_accuracy: 0.2422  
Epoch 3/10  
14/14 [=====] - 146s 11s/step - loss: 0.2509 - accuracy: 0.2701 - val_loss: 0.0892 - val_accuracy: 0.2578  
Epoch 4/10  
14/14 [=====] - 110s 8s/step - loss: 0.0422 - accuracy: 0.2433 - val_loss: -0.0103 - val_accuracy: 0.2109  
Epoch 5/10  
14/14 [=====] - 97s 7s/step - loss: -0.1317 - accuracy: 0.2232 - val_loss: -0.2375 - val_accuracy: 0.2578  
Epoch 6/10  
14/14 [=====] - 84s 6s/step - loss: -0.3785 - accuracy: 0.2188 - val_loss: -0.4834 - val_accuracy: 0.2344  
Epoch 7/10  
14/14 [=====] - 72s 5s/step - loss: -0.7681 - accuracy: 0.2254 - val_loss: -1.0335 - val_accuracy: 0.2734  
Epoch 8/10  
14/14 [=====] - 61s 5s/step - loss: -1.0043 - accuracy: 0.2031 - val_loss: -0.7531 - val_accuracy: 0.2891  
Epoch 9/10  
14/14 [=====] - 57s 4s/step - loss: -1.4402 - accuracy: 0.2212 - val_loss: -1.9187 - val_accuracy: 0.1875  
Epoch 10/10  
14/14 [=====] - 49s 4s/step - loss: -1.6560 - accuracy: 0.2522 - val_loss: -2.7271 - val_accuracy: 0.2031  
<keras.callbacks.History at 0x7f160b49db50>
```

7.Save the Model & Test the Model

```
[ ] model.save("flowers.h5")  
  
[ ] ls  
  
drive/  flowers.h5  sample_data/  
  
[ ] from keras.models import load_model  
  
    #import image class from keros  
  
    from keras.preprocessing import image  
  
    #import numpy  
  
    import numpy as np  
  
    #import cv2  
  
    import cv2  
  
[ ] #Load the saved model  
  
    model = load_model("flowers.h5")
```