**Augmenting the data**

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

**import** cv2

**from** os **import** listdr

**import** time

**def** hes\_string(sec\_elapsed):

h**=**int(sec\_elapsed**/**(60**\***60))

m**=**int((sec\_elapsed **%** (60**\***60))**/**60)

s**=**sec\_elapsed**%**60

**return** f"{h}:{m}:{round(s,l)}"

**def** augment\_data(file\_dir,n\_generated\_samples,save\_to\_dir):

data\_gen**=**ImageDataGenerator(rotation\_range**=**30,width\_shift\_range**=**0.1,height\_shift\_range**=**0.15,shear\_range**=**0.25,zoom\_range**=**0.2,horizontal\_flip**=True**,vertical\_flip**=False**,fill\_mode**=**'nearest',brightness\_range**=**(0.5,1.2))

**for** filename **in** listdir(file\_dir):

image **=** cv2**.**imread(file\_dir **+** '/' **+** filename)

image**=**image**.**reshape((1,)**+**image**.**shape)

save\_prefix **=** 'aug\_' **+** filename [:**-**4]

i**=**0

**for** batch **in** data\_gen**.**flow(x**=**image, batch\_size**=**1, save\_to\_dir**=**save\_to\_dir, save\_prefix**=**save\_prefix, save\_format**=**'jpg'):

i **+=** 1

**if** i **>** n\_generated\_samples:

**break**

start\_time **=** time**.**time()

augmented\_data\_path **=** 'D:/TSB Projects/Digital Naturalist/augmented data/'

augment\_data(file\_dir**=**'D:/TSB Projects/Digital Naturalist/Digital Naturalist Dataset/Bird/Great Indian Bustard Bird', n\_generated\_samples**=**8, save\_to\_dir**=**augmented\_data\_path**+**'Bird/GIB\_AUG") # augment data for the examples with label equal to GIB in Birds augment\_data(file\_dir='D:**/**TSB Projects**/**Digital Naturalist**/**Digital Naturalist Dataset**/**Bird**/**Spoon Billed Sandpiper Bird', n\_generated\_samples=8, save\_to\_dir=augmented\_data\_path+'Bird**/**SPS\_AUG")

augment\_data(file\_dir**=**"D:/TSB Projects/Digital Naturalist/Digital Naturalist Dataset/Flower/Corpse Flower', n\_generated\_samples=8, save\_to\_dir=augmented\_data\_path+'Flower/Corpse\_AUG')

augment\_data(file\_dir**=**'D:/TSB Projects/Digital Naturalist/Digital Naturalist Dataset/Flower/Lady Slipper Orchid Flower', n\_generated\_samples**=**8, save\_to\_dir**=**augmented\_data\_path**+**' Flower/LS\_Orchid\_AUG")

augment\_data(file\_dir**=**'D:/TSB Projects/Digital Naturalist/Digital Naturalist Dataset/Mammal/Pangolin Mammal', n\_generated\_samples**=**8, save\_to\_dir**=**augmented\_data\_path**+**'Mammal/Pangolin\_AUG") # augment data for the examples with label equal to GIB in Birds

augment\_data(file\_dir**=**'D:/TSB Projects/Digital Naturalist/Digital Naturalist Dataset/Mammal/Senenca White Deer Mammal', n\_generated\_samples**=**8, save\_to\_dir**=**augmented\_data\_path**+**'Mammal/SW\_Deer\_AUG")

end\_time **=** time**.**time()

execution\_time **=** (end\_time\_start time)print(f"elasped time: {hms\_string(execution\_time)}")