**Module 9**

Apply data augmentation techniques(rotation, zoom, width shift , height shift and horizontal flip) for the following images

import cv2

img = cv2.imread('C:/Users/Lenovo/Downloads/Study material/AI/Convolutional Neural Network/Assignment/000001.jpg')

num\_rows, num\_cols = img.shape[:2]

rotation\_matrix = cv2.getRotationMatrix2D((num\_cols/2, num\_rows/2), 30, 0.7)

img\_rotation = cv2.warpAffine(img, rotation\_matrix, (num\_cols, num\_rows))

cv2.imshow('Rotation', img\_rotation)

cv2.waitKey(0)



import cv2

img = cv2.imread('C:/Users/Lenovo/Downloads/Study material/AI/Convolutional Neural Network/Assignment/000456.jpg')

cv2.imshow('Original Image', img)

img\_scaled = cv2.resize(img,None,fx=1.2, fy=1.2, interpolation =cv2.INTER\_LINEAR)

cv2.imshow('Scaling - Linear Interpolation', img\_scaled)

img\_scaled = cv2.resize(img,None,fx=1.2, fy=1.2, interpolation = cv2.INTER\_CUBIC)

cv2.imshow('Scaling - Cubic Interpolation', img\_scaled)

img\_scaled = cv2.resize(img,(450, 400), interpolation = cv2.INTER\_AREA)

cv2.imshow('Scaling - Skewed Size', img\_scaled)

cv2.waitKey(0)









import cv2

# Load the image

img = cv2.imread('C:/Users/Lenovo/Downloads/Study material/AI/Convolutional Neural Network/Assignment/004545.jpg')

# Perform width shift

width\_shift = 50

height, width = img.shape[:2]

img\_width\_shift = img[:, width\_shift:] # Shift to the right

img\_width\_shift = cv2.resize(img\_width\_shift, (width, height))

# Perform height shift

height\_shift = 50

img\_height\_shift = img[height\_shift:, :] # Shift downwards

img\_height\_shift = cv2.resize(img\_height\_shift, (width, height))

# Perform horizontal flip

img\_horizontal\_flip = cv2.flip(img, 1) # Flip around y-axis

# Display the original and augmented images

cv2.imshow('Original', img)

cv2.imshow('Width Shift', img\_width\_shift)

cv2.imshow('Height Shift', img\_height\_shift)

cv2.imshow('Horizontal Flip', img\_horizontal\_flip)

cv2.waitKey(0)

cv2.destroyAllWindows()







