Image and Video Processing Lab (CSC18205) **Session: Winter 2020-21**
VIII Dual Degree (CSE) **Date: 14.01.2021**

Assignment-1 (Pixel Geometry)

1. Read an image $\boldsymbol{I(x,y)}$ from the working directory. Find the dimension of the image using appropriate built-in function. Then, your program should compute the mirror image of the input image $\boldsymbol{I(x,y)}$.

Sample Input: $I(x,y)$ =

11	61	28	21	23
16	75	31	24	27
26	99	42	26	29
26	93	54	27	20
37	86	55	21	25

Sample Output:

23	21	28	61	11
27	24	31	75	16
29	26	42	99	26
20	27	54	93	26
25	21	55	86	37

2. You are given a grayscale image $\boldsymbol{I(x,y)}$ of size $\boldsymbol{M \times N}$. Your task is to find different paths between two given points. Your program should take image $\boldsymbol{I}$, points $\boldsymbol{P(x,y)}$ and $\boldsymbol{Q(x',y')}$, and set $\boldsymbol{V}$ as inputs and print the locations of all *4-paths*, *8-paths* and *m-paths* between these points.

Sample Input:

$I(x,y)$ =

8	1	0
7	1	6
10	2	0

$\boldsymbol{Enter\ the\ first\ location}\ P = (1,3)$

$Enter\ the\ second\ locations\ Q = (3,3)$

$Enter\ the\ value\ of\ set\ V = \{0,1\}$

Sample Output:

4-paths are: No *4-path* exits.

8-paths are: $(1,3),(1,2),(2,2),(3,3)$ and $(1,3),(2,2),(3,3)$

m-paths are: $(1,3),(1,2),(2,2),(3,3)$

3. You are given a binary image $B(x, y)$. Write a program that can perform the following tasks:

a) Check that if there exists an *8-path* between two given input points in the foreground. Assume that the foreground is represented with $1's$ in the binary image.

b) Convert that one-pixel-thick *8-path* to a *4-path*.

Sample Input:

Binary image

$Enter\ the\ first\ point\ P\ =\ (2, 5)$

$Enter\ the\ second\ point\ Q\ =\ (38, 37)$

Sample Output

The *8-path* exists between *P* and *Q*.

The output image is:

Output image

4. Read a binary image from the working directory. Write a program to find the number of connected components present in the binary image. Use *8-connected* as a connectivity criterion.

Sample Input:

Binary image

Sample Output

The number connected components: 6