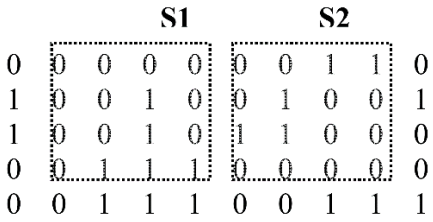
Carleton University
School of Information Technology
OSS 4006 – Image Processing
Fall 2020
Instructor: Dr. Marzieh Amini
Assignment 1

You must submit the assignment to cuLearn by Oct. 13th, 2020 at 8 am.

Q1

Consider the two images subsets, S1 and S2, shown in the following figure. For V={1}, determine whether these two subsets are
(a) 4-adjacent
(b) 8-adjacent
(c) m-adjacent



Q2: Zooming and Shrinking Images by Pixel Replication

(a) Write a computer program capable of zooming and shrinking an image by pixel replication. Assume that the desired zoom/shrink factors are integers.

(b) Use Fig. Q2 and use your program to shrink the image by a factor of 10.

(c) Use your program to zoom the image in (b) back to the resolution of the original. Explain the reasons for their differences.

Q3: Zooming and Shrinking Images by Bilinear Interpolation

(a) Write a computer program capable of zooming and shrinking an image by bilinear interpolation. The input to your program is the desired resolution (in dpi) of the resulting image.

(b) Use Fig. Q2 and use your program to shrink this from 1250 dpi t0 100 dpi.

(c) Use your program to zoom the image in (b) back to 1250 dpi. Explain the reasons for their differences.

Q4: Histogram Equalization

(a) Write a computer program for computing the histogram of an image.

(b) Implement the histogram equalization technique.

(c) Use Fig. Q4 and perform histogram equalization on it.

As a minimum, your report should include the original image, a plot of its histogram, a plot of the histogram-equalization transformation function, the enhanced image, and a plot of its histogram. Use this information to explain why the resulting image was enhanced as it was.

Q5: Histogram Equalization

Find all the bit planes of the following 4-bit image:

0	1	8	6
2	2	1	1
1	15	14	12
3	6	9	10