CS631T – Spring 2019
Assignment 2 – Enhancement and Binary Analysis Exercises
Due Friday, 02/15/2019
Submit electronically before 11:59pm on Blackboard
Total Points: 40 points

Part1: Matlab Coding

Save all solutions in a **single** m-file. Be sure to place semicolons wherever appropriate, to suppress unnecessary console output, such as when loading images into memory, or operating on them. **You should submit only your m-file via the BB system. Please do not send any image**!

Please include comments at the top of each m-file. The comments should contain at least the following: **your name, your email, and assignment number**. **In your main function, place a message "-----Finish Solving Problem X-----" followed by a pause command (i.e., wait for a key to be pressed before continuing) at the end of each solution, where X is the question number (i.e., 1, 2, or 3).**

Problem1: Exercises on Image Scaling and Histogram Equalization [10 points]

a) Use the Matlab function **imadjust** to scale the image Food.jpg into an appropriate range [NewMin, NewMax] so the original image is enhanced to a good quality. Save the scaled image into **ScaledFood**. Display the original image, and the scaled image side-by-side on figure 1 with appropriate titles.

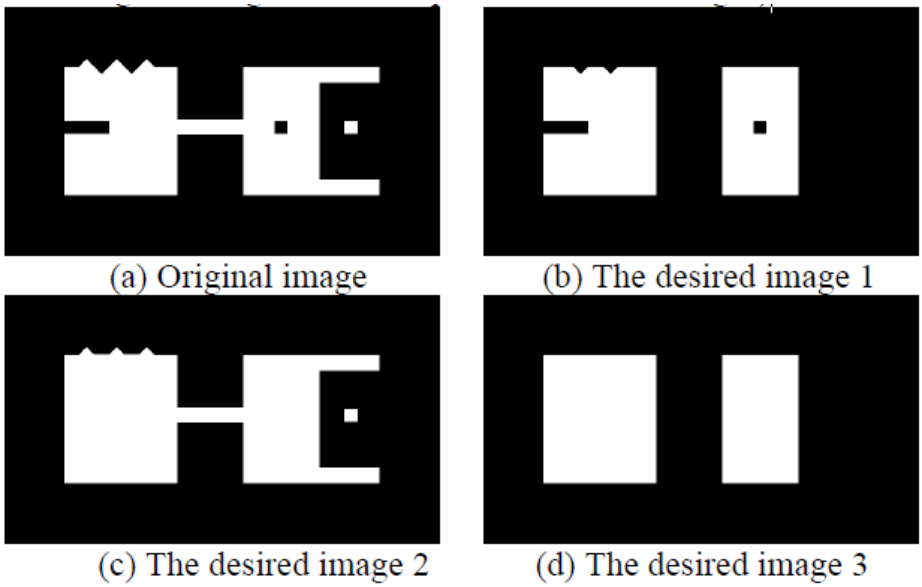
b) Use the Matlab function **imhist** to calculate the histogram of image **Food**. Tune the parameters of num_bins to see the different results. Display the above calculated histogram and its normalized histogram side-by-side on figure 2 with appropriate titles on both axes.

c) Use the Matlab histogram equalization function **histeq** on **Food** image. Save the enhanced image as **EqualizedFood**. Display the original image, your scaled image **ScaledFood**, and your histogram enhanced image **EqualizedFood** with appropriate titles on figure 3.

d) Close all figures and all variables in the workspace.

Problem2: [8 points]

Load in Shapes.tif image. Apply appropriate morphological operation(s) on the original image to obtain the following three desired images, respectively. Display the three resultant images on figure 2 with appropriate titles.



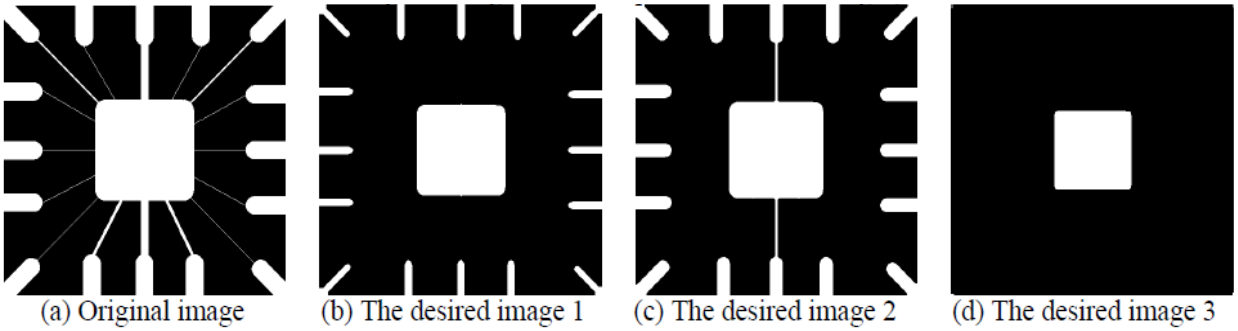
(a) Original image (b) The desired image 1

(c) The desired image 2 (d) The desired image 3

Hint: Matlab functions *imdilate, imerode, imopen, imclose, strel* might be needed. Choose a proper size of structuring element so the unwanted parts could be closed or opened.

Problem3: [8 points]

Load in Wirebond.tif image. Apply appropriate morphological operation(s) on the original image to obtain the following three desired images, respectively. Display the three resultant images on figure 3 with appropriate titles.



(a) Original image (b) The desired image 1 (c) The desired image 2 (d) The desired image 3

Hint: Try erode the image with circle shape SE of different sizes.

Problem4: Morphological operations on gray image [4 points]

Morphological operations (same matlab functions) can be applied on gray image as well. Load in City.jpg image. Apply the dilation, save the resultant image as A; then apply the erosion operation on the original image, save the resultant image as B. Let C = A – B. Use a 3-by-3 square structuring element. Display the resultant image C on figure 4. Use Matlab display command to discuss the reason for such an appearance.

Part2: Exercise. Submit the answers of this part as a word file or a pdf file separately from the Matlab m-file above.

In lecture 2, we covered textbook 2.5, 9.1-9.5 and 10.3.

Problem5: Combination of foreground set B1 and background B2 in Hit-or-Miss Transformation. [10 points]

Read through the following link http://homepages.inf.ed.ac.uk/rbf/HIPR2/hitmiss.htm which explains a simple way that B1 and B2 in the Hit-or-Miss Transformation can be combined into one structuring element (SE). In such a situation, the value 0, 1, and blank in SE have different meanings. Draw the result of first image in Figure 3 after applying the following SE:

0	0	
0	1	1
	1	

Submit both m-file and text file (word or pdf) to BB on the due date.