CS 615
Digital Image Processing
Assignment #2

Exercise 1: Approximate Contour Image Generation

Obtain the image Mammogram. This image has 256×256 pixels. Each pixel has 8 bits.
1) Write a program to convert this gray scale image into a binary image by simple thresholding.
In the thresholded image, use a value of 255 for logical one and a value of 0 for logical zero. There are two main regions in the input image: the imaged tissue and the dark background region on the left side of the image. Select a threshold value so that the binary image output by your program is equal to logical one over the background region and logical zero over the tissue. Call this output image result1.
2) Write a program to implement the Approximate Contour Image Generation algorithm discussed in class. This program should input a binary image like result1 and output a binary contour image. Run the program on the image result1 produced above. Call the output image from this program result2. Display the original image, result1, and result2.

Exercise 2: Binary Template Matching

Write a program to find instances of your template in the image using the Binary Template Matching algorithm discussed in class. You will have to design the template yourself based on an analysis of the image.
If $J = MATCH(I_1, I_2)$ then $M_2(I_1, I_2) = \sum\sum J(i,j)$ over all rows and columns of J.
Apply the match measure M_2 at every pixel in the input image where a sufficiently large neighborhood exists. Construct an output image J_1 where each pixel is equal to the match measure M_2 (set J_1 equal to zero at pixels where a sufficiently large neighborhood does not exist in the input image). Threshold the image J_1 to obtain a binary image J_2 that should be equal to logical zero at pixels where there is a high probability that your template is present in the input image. Display the original image, the template, J_1 and J_2.

Exercise 3: Histogram Equalization

Write a program to perform histogram equalization on images. Turn in your Matlab code, printouts of the original and equalized image(s), and histograms of the original and equalized image(s).