BME 7112 PROCESSING OF MEDICAL IMAGES SPRING 2019

Homework Project # 6 (10 points) **Due Date: 03/21/2019**

In this project, you will explore the use of various edge detection methods. The test image file, "**Data_File_6.tif"** is available on Pilot.

You will use MATLAB's built-in functions for Task 1 and you'll write your own filter in Task 2. You may use MATLAB's *padarray* function in both tasks.

1. Task 1. Apply the following edge operators to the test image: Sobel (S), Prewitt (P), Canny (C), LoG (L), Roberts (R) and zero-crossing method (Z). Use appropriate image padding. Determine the optimum threshold for each operator. Overlay the detected edges on the original image. Note that green tends to be a good color choice for contours overlaid on a grayscale image. Consider comparing the results with and without an edge-thinning operation.

   You may use MATLAB's *edge* function for Task 1.

2. Task 2. Write your own edge detection filter and apply it to the test image (M). For this task, you may use MATLAB's *imfilter* function, but define your custom kernel.

Submit your final images for all parts (6S, 6P, 6C, 6L, 6R, 6Z, 6M).

Submit your MATLAB code (one or several programs) and a single report that describes the results with each edge operator. Include threshold values if thresholds are invoked. How did you choose a threshold? On which parts of the image does each filter perform well? Not so well? Why? What do you notice about the detected edges from each operator?

Describe the custom filter that you implemented. How do the results of the standard edge operators and your operator compare? Include resultant images and code sections in your report as needed to illustrate your approach and findings. Be sure to include all files needed for your code to execute.

Use these filenames:

<u>Task 1:</u>

Code: "BME7112_HW6_1_YLN_yourFilename.m"
Indicate S/P/C/L/R/Z in filename if you have multiple .m files

Images : "BME7112_HW6_YLN_1X.tif"
X = S/P/C/L/R/Z to indicate the filter type

<u>Task 2:</u>

Code: "BME7112_HW6_2_YLN_yourFilename.m"

Images : "BME7112_HW6_YLN_2M.tif

<u>Combined Report:</u>

Report: "BME7112_HW6_YLN.docx" (or .pdf)