# Practical Exercises for Image Processing

# Exercise E

E.1) Load a 1 dimensional edge stored in “edge.mat” file by using ‘load’ command on Matlab.

E.2) Convolve the edge you have loaded in E.1 with the mask mx1= $[1 \quad -1]$ by using ‘conv’ command. What does the convolution of mask m1 do to the signal? How can you find the location of the edge from the convolved signal?

E.3) Convolve the edge you have loaded in E.1 with the mask mx2= $[1 \quad -2 \quad 1]$ by using ‘conv’ command. What does the convolution of mask m2 do to the signal? How can you find the location of the edge from the convolved signal?

E.4) Add some Gaussian noise with standard deviations 1, and 3 to the edge signal and convolve mx1 and mx2 to the noisy signal and observe the results. How can you now find the location of the edge?

E.5) Use a Gaussian filter with standard deviation 10 to smooth the noisy edge signals you produced in E.4) and then convolve mx1 and mx2 to the smoothed signals. Can you now find the location of the edge?

E.5) Load the Lena image by using the ‘imread’. Convolve the image with mx1= $[1 \quad -1]$ and display the magnitude of the convolved image( $|I_x|$ ). What has the mx1 mask done to the image?

E.6) Convolve the image with my1= $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$ and display the magnitude of the convolved image ( $|I_y|$ ). What has the my1 mask done to the image? Now display $\sqrt{|I_x|^2 + |I_y|^2}$ .

E.7) Now produce an edge map of the image by examining the pixels in $\sqrt{|I_x|^2 + |I_y|^2}$ . If the value of $\sqrt{|I_x|^2 + |I_y|^2}$ in a pixel is greater than a threshold, then the gray scale of the corresponding pixel in the edge map is set to 1. However if a pixel in $\sqrt{|I_x|^2 + |I_y|^2}$ is less than the threshold, then the gray scale of the corresponding pixel in the edge map is set to zero. Use values of 100, 50 and 30 as the threshold values.

E.8) By using the ‘Edge’ command, produce an edge map of the Lena image based on the ‘Roberts’, ‘Prewitt’, ‘Sobel’, ‘Laplacian of Gaussian’ and ‘Canny’ edge detection methods.

E.9) Add some Gaussian noise with a standard deviations 20 and 50 to the Lena image and produce edge maps of the noisy Lena images based on the ‘Roberts’, ‘Prewitt’, ‘Sobel’, and ‘Canny’ edge detection methods. Which ones show the best and the worst performances at the presence of noise?