



Eastern Mediterranean University

Department of Computer Engineering

CMPE/CMSE 424 Introduction to Image Processing

Laboratory Work #5

EDGE DETECTION ON NOISY IMAGES

The objective of this experiment is to perform image segmentation using several edge detection techniques. Segmentation subdivides an image into its constituent regions or objects. Segmentation algorithms are based on one of two basic properties of image intensity values: discontinuity and similarity. In the first category, the approach is to partition an image based on abrupt changes in intensity, such as edges in an image. The second category is based on partitioning an image into regions that are similar according to a set of predefined criteria [R. C. Gonzalez, R. E. Woods and S. L. Eddins, *Digital Image Processing using MATLAB*, 2nd Edition, Prentice Hall, 2009]. Edge detection techniques will be applied on original and noisy images to compare the edges obtained on these images using several edge detection techniques.

EXPERIMENTAL WORK:

E1. Edge detection is an important approach for image segmentation for detecting meaningful discontinuities in intensity values. Such discontinuities are detected using first- and second-order derivatives. Edge detection can be done using MATLAB Image Processing Toolbox with “edge” function.

(a) Use “edge” function to perform the following edge detectors on Fig1.tif and Fig2.tif:

- Sobel Edge Detector
- Prewitt Edge Detector
- Roberts Edge Detector
- Laplacian of a Gaussian (LoG) Detector (known as Marr-Hildreth Edge Detector)
- Zero-Crossings Detector
- Canny Edge Detector

(b) Apply Marr-Hildreth Edge Detection and Canny Edge Detection techniques on Fig1.tif and Fig2.tif before and after adding the following noise types separately using the function “imnoise2” [from the reference book “R. C. Gonzalez, R. E. Woods and S. L. Eddins, *Digital Image Processing using MATLAB*, ^{2nd} Edition, Prentice Hall, 2009”]:

- (i) Uniform noise
- (ii) Gaussian noise
- (iii) Salt & Pepper noise
- (iv) Lognormal noise
- (v) Rayleigh noise
- (vi) Exponential noise
- (vii) Erlang noise

(c) Comment on the results obtained with Marr-Hildreth Edge Detector and Canny Edge Detector before and after applying the noise types in E1(b) on Fig1.tif and Fig2.tif.

E2. Write down a report (2 or 3 pages) discussing the results obtained in E1. The report will be submitted to the assistant. (*Discussion of the results must be written with your own words, otherwise the report will not be graded.*)
