Eastern Mediterranean University

Department of Computer Engineering

CMPE/CMSE 424 Introduction to Image Processing

Laboratory Work #2

DIGITAL IMAGE FUNDAMENTALS (IMAGE INTERPOLATION, ARITHMETIC AND SET OPERATIONS)

The objective of this experiment is to implement the fundamental techniques of digital image processing using MATLAB Image Processing Toolbox. Image interpolation techniques will be used to shrink, zoom and rotate digital images. Arithmetic and set operations will also be implemented using array operations on the pixels of digital images.

 EXPERIMENTAL WORK:

E1. Image interpolation is a basic tool used in shrinking, zooming, rotating and geometric correction tasks. Use the basic Interpolation Techniques (Nearest Neighbor Interpoation, Bilinear Interpolation, Bicubic Interpolation) to perform the following tasks:

   (a) Use Figures 2.27(a), 2.30(a) and 2.32(a) to <u>shrink</u>, <u>zoom</u> and <u>rotate</u> the images using different parameter values with **imresize** and **imrotate** functions.
   (b) Display the output of each figure for the 3 tasks given above using 3 interpolation techniques separately.

E2. Arithmetic operations and set operations can be implemented using specific functions. Perform the following tasks to implement subtraction, multiplication and complement operations:

   (a) Using Figure 2.27 (a) from the reference book "R. C. Gonzalez and R. E. Woods, *Digital Image Processing,* 3rd Edition, Prentice Hall, 2008", obtain the image in (b) by setting the least significant bit of every pixel in (a) to zero and then obtain the <u>difference</u> of images (a) and (b) which is shown in part (c) of the figure.

(b) Using Figure 2.30 (a) and (b) from the reference book "R. C. Gonzalez and R. E. Woods, *Digital Image Processing,* 3rd Edition, Prentice Hall, 2008", try to obtain the product of images (a) and (b) which is shown in part (c) of the figure.

(c) Using Figure 2.32 (a) from the reference book "R. C. Gonzalez and R. E. Woods, *Digital Image Processing,* 3rd Edition, Prentice Hall, 2008", try to obtain the image negative obtained using set complementation which is shown in part (c) of the figure.

E3. Write down a <u>report</u> (1 or 2 pages) discussing the results obtained in E1 and E2. The report will be submitted to the assistant 1 day after the lab date. *(Discussion of the results must be written with your own words, otherwise the report will not be graded.)*