Noakhali Science and Technology University

Department of Information and Communication Engineering

DIGITAL IMAGE PROCESSING

LAB MANUAL 6

Spatial Filtering

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Lab Objectives:

The objective of this lab is to understand & implement:

1. Learn about convolution operation
2. Smoothing Spatial Filters
3. Order Statistics Filters
   a. Median
   b. Max
   c. Min

Convolution:

Convolution denotes the sliding of a function over another function and computing their product sum over the whole interval. In terms of image, it usually involves running a filter/kernel for smoothing/noise reducing/ edge detection/ template matching- as all of them are done using some kernel who slide over the images.

Different Kind Of Noise:

- Salt and pepper noise Random dark (pepper) and bright (salt) pixels in an image.
- Gaussian Noise Noises that are distributed with Gaussian probability distribution

Different Kinds of Filters:

- Max Filter Chooses the maximum pixel value from the window as the center value. Good for reducing pepper noises.
- Min Filter Chooses the minimum pixel value from the window as the center value. Good for reducing salt noises.
- Median Filter Chooses the median pixel value from the window as the center value. Good for reducing both salt and pepper noises
- Average Filter Chooses the average pixel value from the window as the center value. Good for reducing noises and sharpness caused by random pixels- but reduces the pixel intensities. It is a linear filter.

Practice Tasks:

TASK 1

a) Write a code from scratch which will take an image and a kernel and run convolution.

b) Learn the use of Matlab's im2conv() function.

TASK 2

a) Learn the use of imnoise() function of Matlab and introduce noises in an image.

b) Write a program to implement Smoothing Spatial filter. Display the entire output images with original image in same figure and write down your observations.

c) Write a program to implement order statistics filters. Display the entire output images with original image in same figure and write down your observations.