Noakhali Science and Technology University

Department of Information and Communication Engineering

**DIGITAL IMAGE**

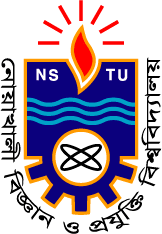
**PROCESSING**

**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
   1. Median
   2. Max
   3. 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**

1. Write a code from scratch which will take an image and a kernel and run convolution.
2. Learn the use of Matlab’s im2conv() function.

**TASK 2**

1. Learn the use of imnoise() function of Matlab and introduce noises in an image.
2. Write a program to implement Smoothing Spatial filter. Display the entire output images with original image in same figure and write down your observations.
3. Write a program to implement order statistics filters. Display the entire output images with original image in same figure and write down your observations.