

Department of Computer Science and Engineering

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CS4043 IMAGE PROCESSING

Exercise Set 5

Date of posting assignment : 30/1/2019

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1. Perform following operations on the given image.
 - (a) $G(i, j) = \log(1 + (e^\sigma) I(i, j))$ Try this transformation for various values of sigma ranging from 0 to 2 and note down your observations. Give a plausible explanation for the observations.
[2 marks]
 - (b) $G(i, j) = e^{\sigma I(i, j)}$ Try this transformation for various values of sigma ranging from 0 to 2 and note down your observations. Give a plausible explanation for the observations.
[2 marks]
(*Hint : Plot the functions above and try to explain the observations based on the function property)
2. Add gaussian noise to the grayscale image (*cameraman.tif*) with the following parameters:
 - (a) Mean 0, variance 0.01
 - (b) Mean 0, variance 0.02
 - (c) Mean 0, variance 0.05
 - (d) Mean 0, variance 0.1

Perform Image Averaging. [1 mark]
3. Read cameraman image, create a dark image with it (*It will appear as a very dark version of the cameraman image*).
 - (a) Compute the histogram of the original image.
 - (b) Compute the histogram of the dark image.
 - (c) Apply histogram equalization on the dark image.

Compare the results.[4 marks]

4. Follow the steps to implement Unsharp masking.

- (a) Read an image $f(x,y)$.
- (b) Blur the original image $f(x,y)$.
- (c) Subtract the blurred image from the original
 $g_{mask} = f(x,y) - f'(x,y)$.
- (d) Add the mask (g_{mask}) back to the original image.

Put all the resulting images together in one window.[5 marks]

5. Create a menu-driven program to implement nxn median, min, max and mean filter (n is odd). Apply above filters on the given image. Give a plausible explanation for the observations. [4 marks]

6. Create a menu-driven program to implement Sobel, Prewit and Laplacian filter. Apply above filters on the given image. Give a plausible explanation for the observations. [3 marks]

7. Read an image and apply the following Low pass filters in frequency domain (*Cutoff frequency* $D_0 = 10, 60, 460$

- Ideal Lowpass filter
- Butterworth Lowpass filter
- Gaussian Lowpass filter

Comment your observations.[4 marks]