Department of Computer Science and Engineering

National institute of Technology calicut

CS4043 IMAGE PROCESSING
Exercise Set 2

Date of posting assignment : 3/1/2019
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1. Find the mean pixel intensity of the sample_image given. Write a program that converts the image to a binary image by using the following transformation.

$$G(i,j) = \begin{cases} 1 & \text{if I(i, j)} > \text{mean} \\ 0 & \text{if I(i, j)} \leq \text{ mean} \end{cases}$$

[2 marks]

2. Write a program to implement 1-D convolution, where the two input sequences are of length = N? (do not use built-in function for convolution). **[1 mark]**

3. Write a program that computes the 2-D convolution of

   (a) a matrix A on a matrix B.

   (b) a matrix B on a matrix A.

   Observe the difference in the above two results. Assume that the input matrices are of size nxn and mxm. (do not use built-in function for 2-D convolution). **[2 marks]**

4. Write a program to implement 1-D correlation, where the two input sequences are of length = N? (do not use built-in function for correlation). **[1 mark]**

5. Write a program that computes the 2-D correlation of two input matrices.

   (a) a matrix A on a matrix B.

   (b) a matrix B on a matrix A.

   Observe the difference in the above two results. Assume that the input matrices are of size nxn and mxm. (do not use built-in function for 2-D correlation). **[2 marks]**

6. Perform the following arithmetic operations on the given images.

   (a) Addition
   (b) Subtraction
   (c) Multiplication by a constant factor
   (d) Division by a constant factor

   Comment your observations. **[4 marks]**

7. Perform the following arithmetic operations on the given images.

   (a) AND
   (b) OR
   (c) COMPLEMENT

   [3 marks]