Department of Computer Science and Engineering

CS4039D IMAGE PROCESSING LAB- *Test III*

April 14, 2021

1. Read the image cameraman.tif, follow the steps for global thresholding. [**5 Marks**]

   (a) Select an initial estimate for T (select T to be the mean gray value of the image to be segmented). Segment image using following equation.

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

   (b) Segmentation of image using T will produce two groups of pixels: G_1 consists of all pixels with gray level values $>$ T and G_2 consisting of pixels with values $\leq$T.

   (c) Compute the average gray level values A_1 for the pixels in regions G_1 and A_2 for the pixels in regions G_2.

   (d) Compute a new threshold value T=0.5 (A_1+A_2)

   (e) Repeat steps (b) through (d) until the difference between values of T in successive iterations is smaller than a predefined parameter T_0. (In this exercise, T_0=1).

2. Consider the following image segment I.

$$\begin{bmatrix} 128 & 128 & 128 & 64 & 64 & 32 & 32 & 8 \\ 64 & 64 & 128 & 128 & 128 & 8 & 32 & 32 \\ 32 & 8 & 64 & 128 & 128 & 64 & 64 & 64 \\ 8 & 128 & 128 & 64 & 64 & 8 & 64 & 64 \\ 128 & 64 & 64 & 64 & 128 & 128 & 8 & 8 \\ 64 & 64 & 64 & 128 & 128 & 128 & 32 & 32 \\ 8 & 128 & 32 & 64 & 64 & 128 & 128 & 128 \\ 8 & 8 & 64 & 64 & 128 & 128 & 64 & 64 \end{bmatrix}$$

   Based on the histogram, segment the image into two regions. [**5 Marks**]

3. Read an input image, cameraman.tif and compute the edges in the image using different edge detectors like Robert, Prewittt and Sobel. Comment on the results obtained. [**8 Marks**]

4. The region-growing algorithm starts with a seed pixel. The selection of the seed pixel depends on application. You are given two applications: (a) target detection in night vision, and (b) mammogram. Suggest a way to choose the seed pixel in these two applications. [**2 Marks**]