Department of Computer Science and Engineering

National institute of Technology calicut

CS4043 IMAGE PROCESSING
ASSIGNMENT PART II

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Read *cameraman.tif* image and apply the algorithm given below. Plot the resulting image as Image 1.

The following algorithm is for finding a threshold T for Adaptive thresholding (using Otsu's algorithm):

1. Compute normalized histogram of the image, $p_i = \frac{n_i}{MN}$, i= 0,. . . ,L-1
2. Compute cumulative sums, $P_1(k) = \sum_{i=0}^{k} p_i$, k= 0,. . . ,L-1
3. Compute cumulative means,m(k)=$\sum_{i=0}^{k} i * p_i$, k= 0,. . . ,L-1
4. Compute global intensity mean, m_G= $\sum_{i=0}^{L-1} i * p_i$, k= 0,. . . ,L-1
5. Compute between-class variance,

   $\sigma_B^2(k) = \frac{[m_G P_1(k) - m(k)]^2}{P_1(k)[1-P_1(k)]}$, k= 0 ,. . . ,L-1
6. Obtain the Otsu threshold, k*, that is the value of k for which σ_B^2 (k^*) is a maximum-if this maximum is not unique, obtain k^* by avaraging the values of k that correspond to the various maxima detected
7. Obtain the separability measure
   η(k) = $\frac{\sigma_B^2(k^*)}{\sigma_G^2}$
8. Add gaussian noise to the grayscale image (*cameraman.tif*) with the following parameters: **Mean 0, variance 0.10**

   Repeat the steps from 1 to 7 and plot the resulting image as Image2.

Output Required

- Create ASSIGNMENT_PARTII.tar file containing code.
  $ASSG\_PARTII < number > \_ < rollnumber > \_ < firstname > . < extension >$
- Algorithm in a Text file.
- Compare resulting images (Image1 and Image2) and Comment your observations (Documentation required).
- **Reference:Chapter 10, Section 10.3, Digital Image Processing, Gonzalez**