CS 615

Digital Image Processing

Assignment #1

Part A

The gray-level histogram is a graph of the frequency of occurrence of each gray level in an image I. Choose one gray-level image I. Write an M-file to display the histogram of I.

Part B

Image thresholding plays a very important role in image segmentation. This problem deals with the way of choosing the threshold automatically. For choosing a threshold automatically, the following algorithm is applied:

a) Select an initial estimate for T.(A suggested initial value could be the midpoint between the minimum and maximum intensity values in the image).
b) Segment the image using T.This will produce two groups of pixels, G_1 consisting of all pixels with intensity values greater than T, and G_2, consisting of pixels with values less than T.
c) Compute the average intensity values x_1 and x_2 for the pixels in regions G_1 and G_2.
d) Compute a new threshold value: $T = \frac{x_1 + x_2}{2}$.
e) Repeat steps b) through d) until the difference in T in successive iterations is smaller than a predefined parameter T_0.

Apply the above algorithm to an image and show the original image and the new binary image.

Part C

Obtain the image "spot.jpg". This is a 256 × 256 gray scale image with 8-bit pixels. Plot a histogram for the image. Write a program to perform a full-scale contrast stretch on the image. Display the enhanced image and plot its histogram.

Part D: Fading of Images

The fading of images is a special effect that is used in motion features and big screen movies. The fading of one image to another is implemented simply using a pixel by pixel comparison of the two original images. Write a Matlab program that implements the fading algorithm from an initial image to a destination image. Use the Matlab function ‘drawnow’ to display the intermediate images of the fade.