CS 615

Digital Image Processing

Assignment #1

Part A: Histogram

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

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: $T = \dfrac{x_1 + x_2}{2}$.

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: Full Scale Contrast Stretching

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

Image fading is a visual effect commonly used in motion pictures and video production. This effect involves gradually transitioning from one image to another by blending their pixel values over time. The transition is achieved by performing a pixel-by-pixel interpolation between the initial and destination images.

Write a MATLAB program that implements a fading algorithm to transition smoothly from an initial image to a destination image. The program should display intermediate frames during the transition using the MATLAB function 'drawnow.'

Due: 02/25/2025