LAB # 07: Image Thresholding

Lab Objective:

The objective of this lab is to apply different thresholding techniques on image.

Lab Description:

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images. For example in the image shown below threshold is applied around the gray value 160 and we have easily extracted the hand out of the image.

Threshold at 160
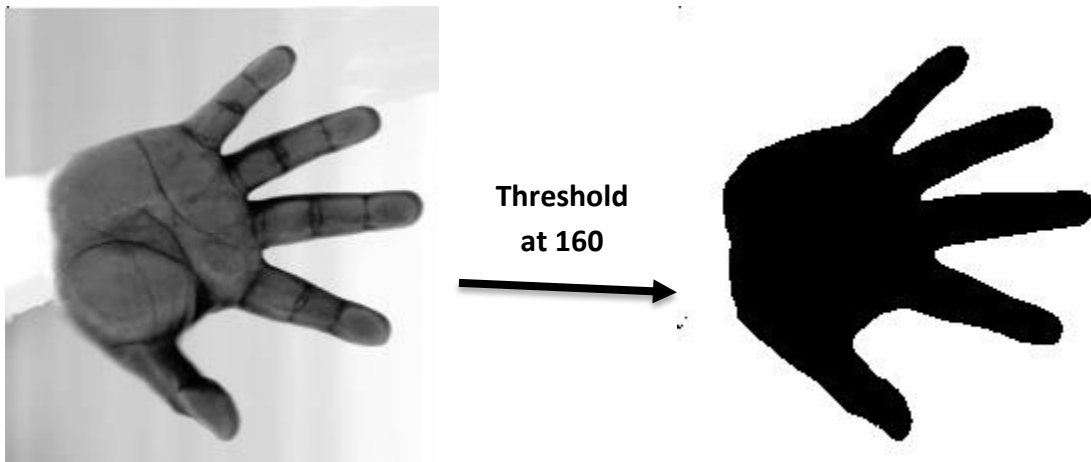
Adaptive thresholding:

In some cases a simple threshold doesn't work. An alternative approach is local threshold which is to statistically examine the intensity values of the local neighborhood of each pixel and threshold on the bases of local mean, median or mode etc.

Local adaptive thresholding:

Local adaptive thresholding is used to convert an image consisting of gray scale pixels to just black and white scale pixels. Unlike the global thresholding technique, local adaptive thresholding chooses different threshold values for every pixel in the image based on an analysis of its neighboring pixels. This is to allow images with varying contrast levels where a global thresholding technique will not work satisfactorily. There are a number of different forms of adaptive thresholding algorithm reported in the image processing literature.
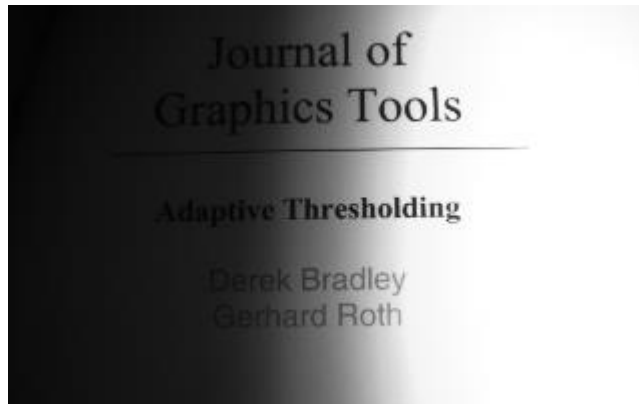
Global adaptive algorithm:

1. Estimate initial mean value of image T1. Make two groups (G1,G2) of pixels based on mean value T1.

2. Compute average gray values m1 and m2 of each group.

3. Compute new threshold value T=(m1+m2)/2

4. Repeat steps 2 to 4 to get abs(T_i-T_{i-1})<epsilon

5. When the above condition will satisfy we will have final threshold value depend upon on that we will create binary image.

Lab Task:

Lab Task 1:

Write a program that threshold the provided image using global mean and median.

Lab Task 2:

Now threshold the image by taking threshold value mean of 3x3 block locally.

Lab Task 3:

Implement global adaptive thresholding algorithm to threshold given image.