SGN-12007 Introduction to Image and Video Processing

EXERCISE 3

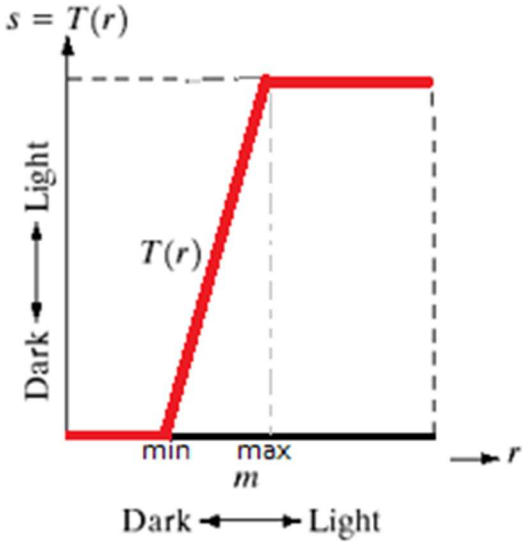
06.11.2017 - 07.11.2017

The tasks should be completed and presented to TA during the lab session. Questions about exercises should be addressed to the TA personally or via email: (firstname.surname@tut.fi).

1. Pixel operation.

a) Load the 'wom1.png' image. Construct your own histogram with 256 bins, and then show it in a figure. Please avoid using imhist, hist or other built-in Matlab functions dealing with image histograms. (You are allowed to use for loop).

b) Create a new function called ContrastStretch to perform contrast stretching on the input image, so as to expand its range to [0 255]. Avoid using imshow(I, [0 255]). (Hint: Find the minimum and maximum values of the input image and stretch the intensity as shown below)



c) Now open 'man8.png' and 'wom1.png' and use the new ContrastStretch function to enhance the images. Show the resultant images and corresponding histograms. Discuss the difference with the original ones.

2. Down sampling.

a) Divide the image *mbaboon.bmp* into blocks of 4×4 pixels. Replace each block by the intensity of the (2, 2) pixel within the block. The resulting image will have the size four times smaller than the original one. Display the down sampled image. Hint (Use blockproc and anonymous function @ in matlab)

b) Repeat (a) but replace with the pixel (1, 1) instead.

c) Repeat (a) but replace with the average intensity over the original block.

Compare the obtained results and discuss what have you learned about sampling from this exercise.

3- Visual Perception

When you enter a dark theater on a bright day, it takes an appreciable interval of time before you can see well enough to find an empty seat. Which visual process is at play in this situation?

4- Histogram

Suppose we have an image $f(x, y)$ and its histogram is hf .

(a) If we transform our image to $f(x, y) \times c$ and ensure the maximum pixel value will not exceed 255, how would hf become?

(b) If we transform our image to $f(x, y) + c$ and ensure the maximum pixel value will not exceed 255, how would hf become?

(c) If we rotate the image $f(x, y)$ by 90^o clockwise, how would hf become?
