Lab 1 - Image Processing EEE330

Report is due 14days from the date of running this lab

Objectives:

1- Introducing the image processing capabilities of Matlab and its Image Processing Toolbox.
2- Learn to read and display different images.
3- Learn basic image processing steps.
4- How to fold an image?
5- How to crop an image?
6- Down-sampling of images
7- Up-sampling of images
8- Image quantization

Matlab functions:

Check the following *Matlab* functions :

help, imread, size, whos, uint8, image, colormap, truesize, imwrite, datacursormode, ginput, imwrite, imnoise, imresize

Hint: read the help about each of the previous functions and any other function you might use. Some Matlab functions have a section describing the *Algorithm(s)* they use, it is worth reading this section.

Tasks:

1. Task: (**20'**)

   Download from ICE the monochrome image *Lenna* and save it as a file on your PC as lenna512.bmp.

   Use the functions *imread* to load the image Lenna512.bmp into Matlab. Display the image with the function *image*, set the color-map with the function *colormap*, and set the image display size with *truesize*. Explain what happens to the displayed image if the color-map is changed to *cool(256), hot(255)*, gray (128), and *gray(64).* (**20'**)

2. Task: (**80'**)

   In this task use the monochrome image *Lenna* to do the following:

   (1) Crop the face of the image *Lenna* (roughly as the one shown in the following) and display it (hint: you may use the command *datacursormode on* to get some useful information). (**10'**)

   (2) Let's call the original image Lenna as I_0, please do the following sub-tasks of down-sampling and up-sampling:
   (a) I_0 -> down-sampling to I_1 with 1/2 size of I_0 (both horizontally and vertically) using nearest neighbor interpolation. Display it and explain your founding in the report; (**10**')
   (b) I_1-> up-sampling to I_1' with the same size of I_0 using nearest neighbor interpolation. Display it and compare to the original image. Explain your founding in the report. (**10'**)
   (c) Repeat the (a) and (b) with bilinear interpolation (optional: bicubic interpolation instead of nearest neighbor interpolation. (**10'**)
   (d) Calculate the psnr between the original image I_0 and the up-sampling images, respectively, and compare the results of different interpolation methods. Explain your founding in the report. (**20'**)

   (3) The original image of Lenna uses 8 bits to represent the intensity levels, so it has 256 gray levels. Write a script to reduce it to 16 values by quantization. Display the quantized image, and describe the effect of severe quantization on images. (**20'**)

Lab Report

Write a **short** report which should contain a **concise description** of your results and observations. **Include** listings of the **Matlab scripts** that you have written. **Describe each of the images** that you were asked to display.

Submit the report electronically and a hardcopy version into the white collecting box beside the office EB310 (Hand written reports are not accepted).

This page last modified on 2018-03-12 11:31 AM