前瞻資訊科技- Digital Image Processing (12/16/2016)

HOMEWORK ASSIGNMENT

Due Date: 11:59am on 12/30/2016

Images are in the raw file format. The size of each image is listed in the appendix.

Please upload the files (including report and the codes) to the course website, http://ceiba.ntu.edu.tw/1051CSIE3015_105_1 by the due date.

PROBLEM 1: COLOR TRANSFORM

As shown in Fig. 1, you are given a color image in RGB format. Please create a new image with the process described below.

(a) Please convert the image into HSV color space.

(b) Modify the hue channel with 30-degree clock-wise, multiply the Saturation by 1.5 and multiply Lightness by 0.65.

(c) Covert back to RGB color image and discuss the effect.

Fig. 1: Sample1.raw

PROBLEM 2: HISTOGRAM EQUALIZATION

In this problem, you are given a gray-scale image D and E, as shown in Fig. 2 and Fig. 3, respectively.

Fig. 2: Sample2.raw

Fig. 3: Sample3.raw

Please follow the instructions below to create several new images.

(a) Plot the histograms of D and E. What can you observe from these two histograms? What can you do to make D look like E?

(b) Perform histogram equalization on D and output the result as H.

(c) Plot the histograms of H. What's the main difference after histogram equalization? Discuss the effect on both images and histograms.

PROBLEM 3: NOISE REMOVAL

The original image I is shown in Fig. 4.

(a) Please add Gaussian noise with $\sigma = 10$ (see appendix) to image I, and denote the result as N_G.

(b) Choose the proper filters and parameters to remove the noise in N_G and denote the resultant image as R_G. Please describe the details of your denoising methods including the choice of parameters.

(c) Compute the PSNR values of R_G and provide some discussions.

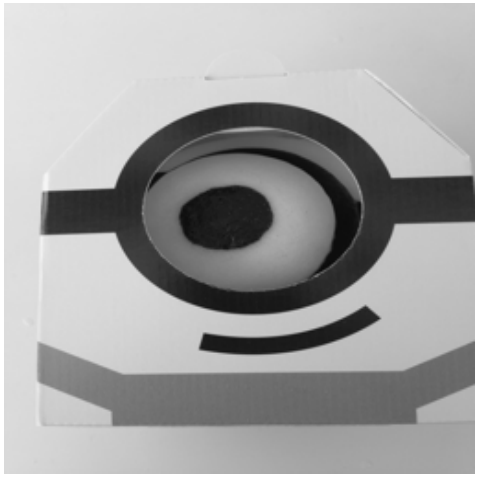

Fig. 4: Sample4.raw

Appendix:

Image files

Problem 1: Color Transform			
Sample1.raw	Fig. 1	256 x 256 x 3 image	RGB
Problem 2: Histogram Equalization			
Sample2.raw	Fig. 2	256 x 256 image	gray-scale
Sample3.raw	Fig. 3	256 x 256 image	gray-scale
Problem 3: Noise Removal			
Sample4.raw	Fig. 4	256 x 256 image	gray-scale