ECE1512 – Homework 2: Wednesday, November 3, 2015

Part A: Web-safe Colors

In order to complete this project, it is necessary that you find a program capable of generating the RGB component images for a given **TIF** color image. For example, MATLAB's "Image Processing Toolbox" can do this, but you can also do it with image editing programs like Adobe's Photo-Shop or Corel's PhotoPaint. It is acceptable for the purposes of this project to convert an image to RGB (and back) manually.

1. Write a computer program that converts an arbitrary RGB color image to a web-safe RGB image (see Fig. 6.10 for a definition of web-safe colors).
2. Download the image in Fig. 6.8 from the book web site (direct link provided below) and convert it to a web-safe RGB color image. Figure 6.8 is given in **TIF** format, so convert your result back to **TIF** (see comments at the beginning of this project). Explain the differences between your result and Fig. 6.8.

Image Database Link: http://www.imageprocessingplace.com/DIP-3E/dip3e_book_images_downloads.htm

Part B: Color Image Enhancement by Histogram Processing

1. Download the dark-stream color picture in Fig. 6.35 from the book web site. Convert the image to RGB (see comments in Part A above). Histogram-equalize the R, G, and B images separately using the histogram-equalization program from your Assignment 1 and convert the image back to TIF format.
2. Form an average histogram from the three histograms in (1) and use it as the basis to obtain a single histogram equalization intensity transformation function. Apply this function to the R, G, and B components individually, and convert the results to jpg. Compare and explain the differences in the TIF images in (1) and (2).

Required Format for Submitting Homework Reports

Homework reports be kept short, and be organized in a uniform manner to simplify grading. The following format achieves these objectives.

Page 1. Cover Page. Typed:

- Homework title
- Course number
- Student's name
- Student ID
- Date due
- Date handed in

Page 2. Technical discussion. One to two pages (max). This section should include the techniques used and the principal equations (if any) implemented.

Page 3 (or 4). Discussion of results. One to two pages (max). A discussion of results should include major findings in terms of the project objectives, and make clear reference to any images generated.

- **Results.** Includes all the images generated in the project. Number images individually so they can be referenced in the preceding discussions.
- **Appendix.** Program listings. Includes listings of all programs written by the student. Standard routines and other material obtained from other sources should be acknowledged by name, but their listings should not be included.

Layout. The entire report must be in standard sheet size format (8.5 x 11 inches in the U.S.)

Alternatively, the report should be submitted as PDF email attachment, using the following subject line:

ECE1512_HOMEWORKTITLE-by-STUDENTNAME

A note on program implementation

As per your textbook recommendation, the objective of the computer programs used here is to teach the student how to manipulate images. There are numerous packages that perform some of the functions required to implement the projects. However, the use of "canned" routines as the only method to implement an entire project is discouraged. For example, if the students are using MATLAB and the Image Processing Toolbox, a balanced approach is to use MATLAB's programming environment to write M functions to implement the projects, using some of MATLAB's own functions in the process. A good example is the implementation of the 2-D Fourier Fast Transform. The student should use the MATLAB function that computes the 2-D FFT directly, but write functions for operations such as centering the transform, multiplying it by a filter function, and obtaining the spectrum.