Principles and Applications of Digital Image Processing

【Fall, 2020】

Homework 5

Part 1: (40%) Color Model Conversion

Design a computer program for color model conversion. Your program should be able to display an image in RGB, CMY, HSI, XYZ, L*a*b*, YUV color planes. Check the following web link for more information about color model conversion.

http://www.cs.rit.edu/~ncs/color/t_convert.html

Part 2: (30%) Pseudo-color Image

Develop a program to display a grayscale image in pseudo-color. In your program, you need to design an interface to both display the grayscale and pseudo-color images for comparison. You also need to show the color table (color bar) with its corresponding grayscale.

Design a user-friendly interface for flexible color table creation. You may learn from popular softwares such as Photoshop or ImageJ for their interface to create a color table.

Part 3: (30%) Color Segmentation

In this assignment, you will practice image segmentation by color clustering, using the k-means algorithm. Your tasks are as follows:

1. Search internet to study the k-means algorithm.
2. Implement a program for image segmentation based on color clustering approach. You may use OpenCV or MATLAB functions for k-means algorithm or you may develop your own function.
3. Test your program with the accompanied images with various levels of complexity. Compare color segmentation results using different k values of the k-means algorithm.
4. Compare the color segmentation results using RGB, HSI, and L*a*b* color planes (using k = 2).

Notes:

1. Please submit your programs and report to the CEIBA course website before **Dec. 2 (2:20PM).**

2. Late submission will have a penalty of 10% discount per day of your homework total score toward a maximum of 50% discount. No late submission over five days will be accepted.