



# Principles and Applications of Digital Image Processing

【Fall, 2016】

## 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](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. 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. 9**. Hand in the hardcopies of your report in the class of **Dec. 9 (2:20PM)**.
2. Late submission will have a penalty of 10% discount per day of your grade toward a minimum score of 60. No late submission over a week will be accepted.