Homework 3

CS 443 Dr. Haeyong Chung

Due: Mar. 15 Midnight

Chroma subsampling is the practice of encoding images by implementing less color (resolution) for chroma (Cb and Cr) information than for luma (Y') information, taking advantage of the human visual system's lower acuity for color differences than for luminance. In this homework, you need to implement two types of Chroma Subsampling 4:2:2, and 4:1:1.

Dr. Chung is providing sample images for this assignment (Find `HW1_sample_images.zip` in Files on class Canvas). You must apply your implemented algorithms for the sample images.

1) Convert RGB color values of your input images to YCbCr components (This is part 2 of hw2; you must not use a Matlab function `rgb2ycbcr()` or other existing codes to convert colors space. If your HW2 codes were incomplete or did not work, you have to contact Dr. Chung)
2) Perform chroma subsampling 1) 4:2:2 and 2) 4:1:1 on color components Cb and Cr
   a) You should apply subsampling for each 2x4 pixel blocks of your input image (**Check the Chapter5 slide**)
3) Convert the subsampled YCbCr color data to the RGB color space, and generate and save your output images for the two subsampling types. In addition, you have to generate separate gray images for Cr and Cb.
4) Discuss and compare the output images between two subsampling types in a report. You also need to compare them with the original input images (4:4:4). The report should include all of 1) your output images and 2) subsampled Cb, and Cr output images (in gray-scale images). You have to describe how the outputs from these two chroma subsampling approaches are different based on your subjective observation.

No need for performing the gamma correction for each pixel before applying chroma subsampling

Do not just use imresize() when you subsample the Cb and Cr channels.

Do not download and use any existing code from the Internet.

What to hand in:

- Your codes.
- All output images generated by both 4:2:2 and 4:1:1 (2 output images in RGB + 2 subsampled Cb images + 2 subsampled Cr images)
- Your report that includes all results and discussion.