BIL464 Multimedia Systems
2014-2015 Fall

Homework 2

Instructor : Mustafa Sert, Asst.Prof.Dr. **Due Date:** Nov.27, 2014

Objectives

- Color conversion, chroma subsampling.

Perform the followings:

A. Design a Matlab Simulink model to perform chroma subsampling on a given RGB image. The model should support the input of the luma-chroma color models, namely YUV and YCbCr and all of the common sampling ratios, i.e., 4:2:2, 4:1:1, 4:2:0, and other variations.

The building blocks of your Simulink model should be as follows:

- Read in an RGB image,
- Convert the given RGB image to the YUV or YCbCr (The luma-chroma color space should be given as a parameter),
- Perform chroma subsampling on the luma-chroma image using a given ratio (The subsampling ratio should be given as a parameter).
- Display each color channel in a separate MATLAB figure using the following format:

Display Original Image (RGB)		
Display R channel	Display G channel	Display B channel
Display chroma-luma image (YUV/YCbCr)*		
Display Y channel	Display U/Cb channel*	Display V/Cr channel*
Display chroma subsampled image (YUV/YCbCr)*		
Display Y channel	Display U/Cb channel*	Display V/Cr channel*

* Display either YUV or YCbCr. The selection is up to you.

B. Investigate how chroma subsampling aliasing errors arise and what they look like.

- Read in a RGB image, e.g. the parrots.jpg above will do.
- Convert the image to YUV or YCrCb color space
- In a similar fashion to the previous question, apply a down and up sampling on the UV or CrCb channels with a scale factor of 2,4,8 etc. You may also try real common subsampling formats i.e 4:2:2, 4:1:1, 4:2:0.
- Reconvert the image back to RGB and display this image. Compare original with the displayed image.
    - Compute the absolute difference of this image and the original and display the resultant difference image. Explain the results you see.

Submit the followings:

a) **Report:** Submit the hardcopy of your reports. The reports should describe the Simulink model you designed, sample outputs, and include the comments regarding the questions.

b) **Soft Copy:** The codes of part A & B.

START EARLY!!!

☯ **This is an individual work.**

☯ **Submission: Nov 27, 2014 to the lab assistant, S. Ezgi Yalnız by the lecture hour. Late submission is not allowed!**

NOTE: *This is not a group assignment, and by submitting your homework it is assumed that all of the work is your own. While you may discuss the problem with other students, any students submitting the same/similar work will be given 0. We will pursue appropriate penalties according the university regulations in the case of any repetition of this behavior.*