

## EE5356 LAB Assignment #3

### Color Transformation

The test image, **Girl256color.raw** (the size is 256\*256 pixels) , for this assignment is available at the class website.

#### Problem 1: RGB component decomposition

- 1) Decompose a given 24bit color image (raw format) into 3 Red, Green, and Blue components and **show those images** in your report and **explain the procedure** (how to get these.)
- 2) Reconstruct the color image from these three RGB components, and **show the reconstructed color image** with your explanation.

NOTE:

- 1: Please explain **in writing** and not just by attaching a source code.
- 2: Since the format of an image is raw format, you cannot use any builtin MATLAB function to do this assignment. You have to open the file by your self to access to data in the image.
- 3: You can use 'image.m' function to display the reconstructed color image if you use MATLAB. See the details by typing 'help image' in the MATLAB command window.

#### Problem 2: Color transformation

**Given** the conversion of the gamma corrected and normalized tri-stimulus analog signals R, G, and B to component  $YU_tV_t$  signals is defined as

$$Y = 0.299R + 0.587G + 0.114B$$

$$U_t = \frac{B - Y}{2.03}$$

$$V_t = \frac{R - Y}{1.14}$$

and RGB to digital component  $Y_dC_bC_r$  conversion is given by

$$Y_d = 219Y + 16$$

$$C_b = \frac{112(B - Y)}{0.886} + 128$$

$$C_r = \frac{112(R - Y)}{0.701} + 128$$

where digital luminance,  $Y_d$ , has a range of (16-235) with 220 levels starting at 16, and digital chrominance difference signals,  $C_b$  and  $C_r$ , have a range of (16-240) with 225 levels centered at 128, then **apply these transforms to get  $YU_tV_t$  and  $Y_dC_bC_r$  from RGB components you obtained in problem 1. Show all the 6 components.**

NOTE:

- 1:  **$R=G=B=1$**  corresponds to reference white C of unity luminance.
- 2: You may use 'imshow.m' to do the scaling of those obtained components which have a range of (0 1.0).