Fundamentals and Practice to Digital Image Processing

ME3614701

2018.1.3

Please zip the folder that contains your solutions and codes, and upload it to Moodle.

- Answer/solution sheet in a .docx, and it contains your answers and the results (with images if needed). Name it in your student ID, e.g., m10603419.docx.
- Codes can be either in C or Matlab. Each code should be named by the problem number, e.g. Prob2a.m, and placed in a subfolder named "Codes".

1. [25/120] How to change the color in cat.jpg shown below in Figure.1a to the Figure.1b? An approximate solution will be acceptable.

Figure1.a

Figure1.b

2. [35/120] Please show the histogram of the original image cat.jpg, and the result of histogram equalization. Consider gray-scaled image. DO NOT use the Matlab functions, imhist and histeq, and write your own code. Compare your results with those obtained by calling imhist and histeq.

3. [25/120] Please adjust the B channel in cat.jpg by using the following transfer function, and show the image before and after adjustment. Furthermore, show the histogram of the B channel before and after.

$$F(x) = \begin{cases} 2x + 20 & x < 80 \\ 1.2x + 30 & 80 \le x < 160 \\ 0.8x - 10 & 160 \le x \end{cases}$$

4. [35/120] Convert cat.jpg from RGB to YCbCr, keep the Y-channel intake, and compress both channels of Cb and Cr in the following way. For each 3x3 patch, use the center pixel value to represent all of the 9 pixels. Compute the information loss caused by this 9:1:1 compression rate.