Due: Thursday 9:00pm, Oct. 29, 2020

NOTE: For all of the homework in this course, do not use the problem-related OpenCV API (neither built-in nor library) to solve your problem.

1. Bit Plane(C/C++) (20%; Figure, 10%; Discussion, 10%)

    (1) Hide baboon_256.raw in lena_256.raw and save the file as lena_with_baboon.raw. Explain your method. Try not to visually alter baboon_256.raw and lena_256.raw as much as you can. Show your results of lena_with_baboon.raw. Calculate MSE and PNSR of your lena_with_baboon.raw with respect to the original lena_256.raw. Your design should have the PSNR value as high as possible in both (1) & (2). (Figure, 5%; Discussion,5%)

    (2) Extract your modified baboon_256.raw from lena_with_baboon.raw. Calculate MSE and PNSR of your extracted baboon_256.raw with respect to the original baboon_256.raw. Your design should have the PSNR value as high as possible in both (1) & (2). (Figure, 5%; Discussion,5%)

2. Bit-plane and Negative(C/C++)(20%;Figure, 10%; Discussion, 10%)
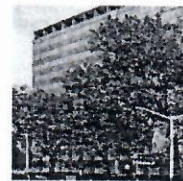
    (a). Synthesize eight bit-plane images (a512x512.raw,…,h512x512.raw) back to the original image (original.raw). The bit-plane images are given in random order (e.g, not from MSB to LSB) and some of them have been processed by the image negative effect. (Figure, 5%; Discussion, 5%)

| a512x512.raw | h512x512.raw | original.raw |

3. Grey Level Transformation(30%; Figure, 15%; Discussion, 15%)

    Use the following methods to adjust the darkened image *livingroom_d512* and the whiten image *cameraman_b512.raw* to improve their contrast.

    (a). Log transformation(c=100 and c=20):

    (b). Power-Law transformation (γ =0.2 and γ =10, Try different c to discuss the effects):

| *livingroom_d512.raw* | *cameraman_b512.raw* |

4. Histogram Equalization (C/C++) (30%; Figure, 15%; Discussion, 15%)

    (a). Plot the histograms of the *livingroom_d512.raw* and *cameraman_b512.raw*. Discuss the difference among these histograms. You have to implement your own histogram function but you can use OpenCV to plot it. (Figure, 10%; Discussion, 5%)

    (b). Perform histogram equalization (implement your own function) on *cameraman_b512.raw* and *livingroom_d512*. Plot their histograms and compare the histograms before and after histogram equalization. Discuss the outcome with (a). (Figure, 10%; Discussion, 5%)