Digital Image Processing (1072)

Homework #3 (DUE: ~~2019.04.29~~ 2019.05.06)

(Please note that you have to upload your source codes (and a brief description about your codes or algorithms, optional) to the server before the deadline. Please check the course website for more details.)

1. Apply the homomorphic filter function modified from Gaussian high-pass filter function as shown in the textbook (e.q. 4-147) with $\gamma_L = 0.4$, $\gamma_H = 3.0$, c = 5, and $D_0 = 20$ to the image "Fig0460a.tif" to see if you can get the identical result as shown in Figure 4.60(b).
   Bonus: design a GUI or integrate to the one you constructed earlier to display this function, and filter parameters (γ_L, γ_H, c and D_0) can be dynamically set by users.

2. For the 24-bit color image: "Lenna_512_color.tiff", please do the following processing with Python:
   (a) Display the original image.
   (b) Obtain its "Red component image", "Green component image", and "Blue component image" and display them as 24-bit color images respectively.
   (c) According to the definition of RGB model and HSI model, try to convert RGB to HSI model, and display its Hue, Saturation, and Intensity components as gray-level images respectively.
   (d) Do color complements to enhance the detail in the image by using RGB model.
   (e) Please do image smoothing with a 5x5 average kernel and sharping with the Laplacian to this "Lenna" image. Display the results and also show the difference from original ones.
   (f) Find some proper thresholds for level-slicing of saturation and hue component images to this "Lenna" image so that the feathers of the hat can be segmented by simple logical or arithmetic operation of these 2 images. Demonstration of images from each steps and final result is required.

   Bonus: to design a GUI or integrate all these functions to the one you constructed earlier is strongly encouraged.