Digital Image Processing (1101) Homework #3

Due: 2021/12/13

評分標準

Note:

1. 上傳一個 zip 檔，檔名：學號_姓名_HW3.zip
2. 請將要執行的程式命名為 hw3.py
3. 沒寫註解者一律扣 10 分
4. Image 開啟請用「相對路徑」
5. 請註明額外使用的套件及安裝方法(可額外寫在 .txt 附上)
6. 請注意執行環境為 Linux 及 python3.5 以上

1. The white bars in the test pattern shown below (BarTest.tif) are 7 pixels wide and 210 pixels high. The separation between bars is 17 pixels. Please apply the following filters to this image and show the results: (a) A 7x7 arithmetic mean filter (b) A 3x3 arithmetic mean filter (c) A 7x7 median filter (d) A 3x3 median filter	12 points (3 points per item)
2. For the 24-bit color image: "Lenna_512_color.tiff", please do the following processing with Python: (a) Display the original image.	8 points
(b) Obtain its "Red component image", "Green component image", and "Blue component image" and display them as 24-bit color images respectively.	15 points (5 points per component)
(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.	18 分 (convert : 6 points 4 points per component)
(d) Do color complements to enhance the detail in the image by using RGB model.	11 分
(e) Please do image smoothing with a 5x5 average kernel and sharping with the Laplacian to this "Lenna" image by using RGB and HSI models respectively. Display the results and also show the difference from original one. Please also show the difference between results obtained by RGB and HSI models.	18 分 (Smoothing : 5 points per model, difference : 8 points)
(f) Find some proper masks 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 step as well as final result is required.	18 分

Bonus: to design a GUI or integrate all these functions to the one you constructed earlier is strongly encouraged. Bonus 5 points