Digital Image Processing (1101)

Homework #2 (DUE: 2021.11.15)

(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.)

A. Construct a simple image processing tool with GUI, providing the following functionalities: (you can either use the one you constructed in HW#1 or create a new one.)

1. Gray-level slicing : display images from certain range of gray levels given by users. Requirements: (1) users can define the range of gray level to be displayed; (2) users can choose either preserve original values of unselected area or display them as black color.
2. Bit-Plane images: display the bit-plane images for the input image. Requirements: users should be able to select which bit-plane image to be displayed.
3. Smoothing and sharpening: providing smoothing and sharpening options for the input images by using spatial filters. Requirements: users should be able to decide the degree of smoothing/ sharpening from GUI.

B. Enhancement Using Spatial Filters

pirate_a

pirate_b

1. Download the images 'pirate_a.raw' and 'pirate_b.raw' as shown the above (512x512, 256 grayscale). Apply a 3x3 averaging mask to both of the images and make a comparison according to your result.
2. Repeat (a), but apply a 3x3 median filter rather than the averaging mask to both of the images. Again, compare these two resultant images and explain it.
3. Choose the best improved image you can obtain from (a) and (b), and apply the Laplacian mask of Figure 3.37(b) to this image. Display the filtered result and compare with the original image.

(This de-noising function can be merged into the GUI tool in Part A.)