Lab Exercises: LAB 5
(Image I/O & Re-scaling)

General guidance:

1. All the images you use can be downloaded from the website: http://www.dcs.qmul.ac.uk/~phao/CIP/Images/
2. The formats for the images we provided are TIF, BMP and RAW.
3. For RAW images, the files have no head data, just the image data as matrices stored. For our RAW images, we do not provide the colour components, and all the data are gray-scale images, a one-byte unsigned integer per pixel, value from 0 to 255.
4. The size of image Cameraman is of 128x128. Other images are of 512x512.

Exercise 1.

Image I/O: Reading an image from a raw format file

To read an image file into a matrix, given the image size.

Exercise 2.

Image I/O: Displaying an image on screen

For an image stored in a matrix, display it in a window on screen. You can use the sample window programme provided on the web.

Exercise 3.

Image I/O: Writing an image into a raw format file

To output an image stored in a matrix to a raw-format image file.

Exercise 4.

Image Pixel Value Re-Scaling: Re-scaling all the pixel values in an image and displaying the image

To re-scale all the pixel values in an image stored in a matrix. The re-scaling factors should be floating-point numbers, which can be from 0 to 2, e.g. 0.5, 0.7, 1.3 and 2.

The pixel values of the images we provided are of one byte per pixel and unsigned integers and from 0 to 255. After rescaling, all the pixel values should be rounded to integers if they are not.

For the results, if a value is less than 0, just set it 0; if a value is greater than 255, just set it 255.

To re-scale an image, you have to find the minimum and the maximum pixel values in the new image.

Questions: What happened if image pixel values are rescaled by 2, rounded to integers, then rescaled by 1/2, and finally rounded to integers again? What happened if image pixel values are rescaled by 1/2, rounded to integers, then rescaled by 2, and finally rounded to integers again?