

Lab Exercises: LAB 3

(arithmetic and Boolean operations)

General guidance:

1. Download the template code to make menus and demonstrate how to read, write and manipulate images.
2. All the images you use can be downloaded from the course website:
<http://www.eecs.qmul.ac.uk/~phao/IP/Images/>
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 values, 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.

Arithmetic operations: Addition, Subtraction, Multiplication and Division of two images

Read two images into 2 matrices and apply arithmetic operations to them for a new image, then shift and re-scale all the pixel values in the result image and display the new image.

Exercise 2.

Bitwise Boolean NOT operation: Bitwise NOT of one image.

Read an images into a matrix and apply bitwise NOT Boolean operation to all the pixel values of the image for a new image, then display the new image.

Exercise 3.

Bitwise Boolean operations: AND, OR and XOR of two images.

Read two images into 2 matrices and apply bitwise Boolean operations, AND, OR and XOR, to the images for a new image, then display the new image.

Exercise 4.

ROI-based operations: Use a Black-and-White image as the Alpha channel for image processing. ROI stands for Region of Interest.

Read or generate a Black-and-White image and use it as the Alpha channel for ROI-based image processing.

If a Boolean AND is used, Black can be 0 for the pixel value, and White can be 255. If an arithmetic multiplication is used, Black can be 0 for the pixel value, and White can be 1. If 0 is for non-ROI pixels, 255 or 1 can be used for ROI, and you can use image NOT or image negative, respectively, to convert between ROI and non-ROI.

Questions: What is the difference between image negative (as in the template code) and image bit-wise NOT?