ICT289: Computer Graphics Principles and Applications

Semester 1 2022

Practical Labs of Weeks 13 and 14:
Image Processing

Objectives: You will learn how to

- Load and save images.
- Compute the histogram of a grayscale image.
- Implement Sobel filtering

Note that Exercise 6.2 will be assessed.

- Internal students need to demonstrate it to their tutors in Week 14.
- External students need to submit their solution either by email to the Unit Coordinator or via LMS.

Exercise 6.1.

The goal of this activity is to understand basic image processing programming.

Download the sample code from LMS and the set of images from LMS. Compile the code and make sure that it runs.

Go through the code and try to understand

- The data structures used to store images.
- The functions used to read a raw image from a file and to store a raw image to a file.
- The OpenGL functions used to display the image.

Exercise 6.2. This exercise will be assessed.

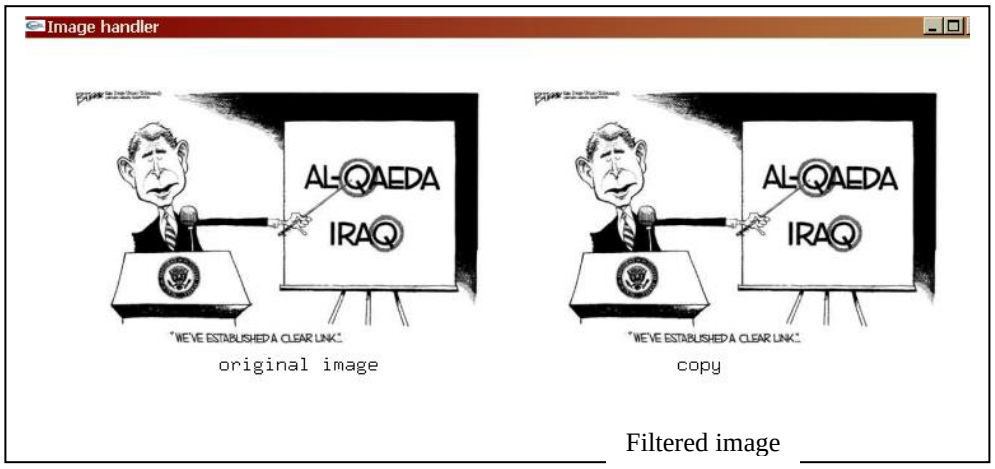
Extend the program Edge.c by adding a function called computeHistogram which takes as input a gray scale image, and the number of bins, and returns the histogram of the image as a 1D array. Your main program should print on the screen the content of the array.

Exercise 6.3. (not assessed)

Extend the program Edge.c by implementing the function

```
void sobelFilter(pixel image[MAXROW][MAXCOL],
                 pixel out_image[MAXROW][MAXCOL])
```

The function takes as input a gray scale image, applies to it the Sobel filter, and returns the filtered imaged. The filtered image should be displayed next to each other as shown in the figure below.



Filtered image

Exercise 6.4 (not assessed)

Modify one of the 3D programs that you have created in the previous labs such that when the user presses the "S" key, the content of the window is saved to disk as a raw image.