

## Assignment 2 Image Filtering and Region Labeling.

*This assignment will be graded, so hand in your work on time.*

In this homework assignment you will be asked to process images. You can find the images you need to process on Canvas. In this assignment you are not allowed to use predefined functions from the OpenCV library or other libraries for Image processing other than to get an image from file, convert it to a grayscale image, convert the image to a matrix and display the image. For each assignment hand in the C or C++ programs themselves together the results and a brief explanation of how the program works preferable on a pdf file.

### Image filtering.

- In the class it was shown that filters can be used for e.g. noise reduction, to smooth or to sharpen an image or enhance certain features. Write a C or C++ program and use image “edge detection.jpg” and convolute this using the following 3x3 Laplacian filter as depicted below. Show and comment your results.

*Table 0-1 Laplacian Filter*

0	-1	0
-1	4	-1
0	-1	0

**Input Image  $\otimes$  Laplacian Filter = Output Image.**

Repeat this task by changing matrix value (2,2) = 8.

- Repeat this task now using the Gradient filter as depicted in table 0-2. Show and comment your results.

*Table 0-2 Gradient Filter*

-1	0	1
-1	0	1
-1	0	1

**Input Image  $\otimes$  Gradient Filter = Output Image.**

### Region Labeling Blob

In certain applications you may want to know some of the properties of the found objects. An example of such an application is if you have an image with bolts and nuts and you want a machine to automatically select only the bolts. Since bolts and nuts have a different shape you could distinguish between bolts and nuts by selecting them based on region properties. Other properties can be color or shapes.

In class we discussed region labeling algorithm. Another example of such algorithm is also

explained on <http://www.labbookpages.co.uk/software/imgProc/blobDetection.html>.

Write a C or C++ region labelling algorithm as explained as above to label the blobs in image 'blobs labelling.jpg.' Show and comment your results. You are free to discuss with other students, but take care you hand in your own original material.

Don't forget to include your name on the document, maximal 2 students per assignment.

Assignments must be handed in before Friday September ..... as a pdf document including sources, comments and the results.