

Assignment 4

Deadline: Tuesday, October 24, 2023 (end of day)

Objective

In this assignment we ask you to implement and apply different local filters. In the first part of this exercise, you will observe the impact of the filter size. In the second part, you will compare two edge detection filters. In the last part you will experiment with statistical filters. Please note that the input and the output image should always have the same size.

Task: Local operators

1. Blurring by convolutions

- ~~(a)~~ Implement your own convolutional mean filter with the following sizes: 3×3 , 5×5 , 9×9 pixels (example kernels provided in the lecture).
- ~~(b)~~ Apply each filter on the greyscale images provided on ILIAS.
- ~~(c)~~ Comment on the results obtained with the different filter sizes.

2. Edge detection

- (a) Implement your own Laplacian of Gaussian filter (example provided in the lecture).
- (b) Implement your own gradient filters for edge detection (examples for vertical and horizontal filters provided in the lecture).
- (c) Apply both edge detection methods to the greyscale images provided on ILIAS.
- (d) Comment on the results obtained with the two methods.

3. Statistical filters

- ~~(a)~~ Implement your own minimum and maximum filters (formulas provided in the lecture), with size 3×3 and 5×5 pixels.
- ~~(b)~~ Apply both filters to the greyscale images provided on ILIAS, as well as their combination (max - min).
- ~~(c)~~ Comment on the results obtained with the individual filters and their combination.

Hand-in

Submit on ILIAS nine and only **nine files**:

- 3 images, one after using a 3*3, 5*5 and 9*9 pixels mean filter,
- 2 images after using a gradient filter and an other with a Laplacian of Gaussian filter.
- 3 images after using a min, max and a (max - min) filter.
- A text file with your name, surname, the link to your GitHub, explain how you get the same input and output size, the link to your GitHub, a short description of you gradient filter and the Laplacian of Gaussian filter, and the responses to the questions 1. c), 2. d) et 3. c).

Please take these conditions into account, otherwise your exercise may not be evaluated.
If you have any questions you can contact us via email.