TP2
Local Filtering and Histograms

In this practical work, we study local filtering and image improvements through histogram modifications. For each item, comment the obtained results.

Exercise 1 : Filtering

- Write a c program that reads a PGM image and computes the image smoothed with the following binomial filter:

$$b_{2,2}(m,n) = \frac{1}{16} \begin{matrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{matrix}$$

  Try it on boat_noise.pgm.

- Add the option to smooth n times as well as the option to smooth with a filter of dimension 5x5 (binomial coefficients can be obtained from the Pascal triangle).

- Implement a median filter and compare it with the binomial filters.

Exercise 2 : Histograms

- Add to the previous program a function that computes the intensity histogram. The histogram will be represented by an array of dimension the maximal number of grayscale intensities (i.e. 255). Plot the histogram[1] for the boat image as well as another image of your choice.

- Modify the program so that it computes the image transformed with a histogram stretching. Plot the new histogram and the transformed images.

- Modify the program so that it computes the image transformed with a histogram equalization. Apply the program on several images.

[1] You can create a CSV file and use any external tool to do the plots/graphs (excel, gnuplot, ...).

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