Computer Vision course

Lab-2 Report

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Task 1:

The first task was about getting a grayscale version of the Garden image. The output obtained is shown below.

a) Original

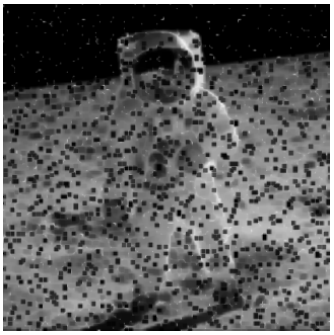
b) Grayscale

Task 2:

The second task was about creating a Max Filter and a Min Filter.
I encountered some problems with “use namespace” that I solved and I also had some issues with the outputs, where the image was modified only in its leftmost ⅓. I realized that it was caused by the function recognizing the input image as a 3 channel image instead of a 1 channel one. I solved the problem by changing the cv:imread() flag parameter.
Salt and pepper noises have been successfully removed from the Astronaut image with a kernel dimension of 3. The various results are shown below:

a) Original

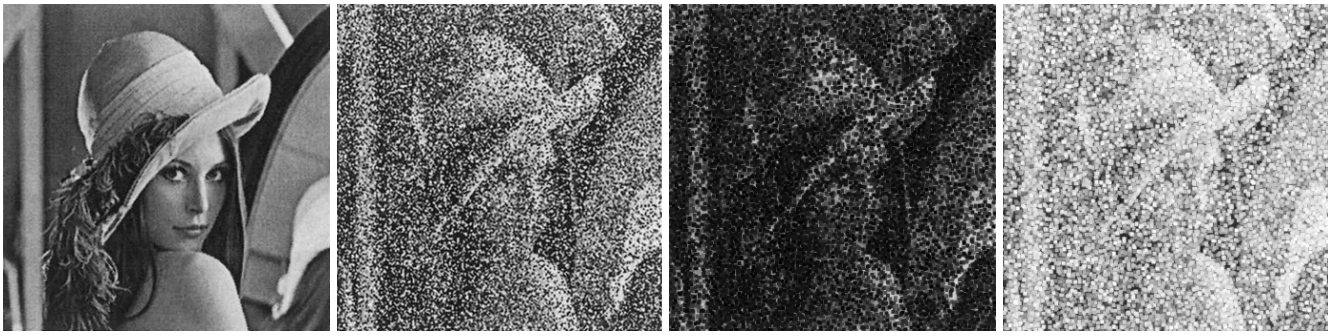
b) Corrupted



c) Min Filter

d) Max Filter

In the Lena corrupted image instead, the noise was too much and these filters didn’t accomplish the purpose with any kernel size. Results are shown below with a size of 3.



a) Original b) Corrupted c) Min Filter d) Max Filter

The cables of the Garden grayscale image were successfully removed with the Max Filter with a kernel size of 5. With higher size values the sharpness loose wasn't worth the best result in the cables removal. At the same time the Min filter couldn't solve the problem.

a) Results of cables removal (Max Filter, ksize=5)

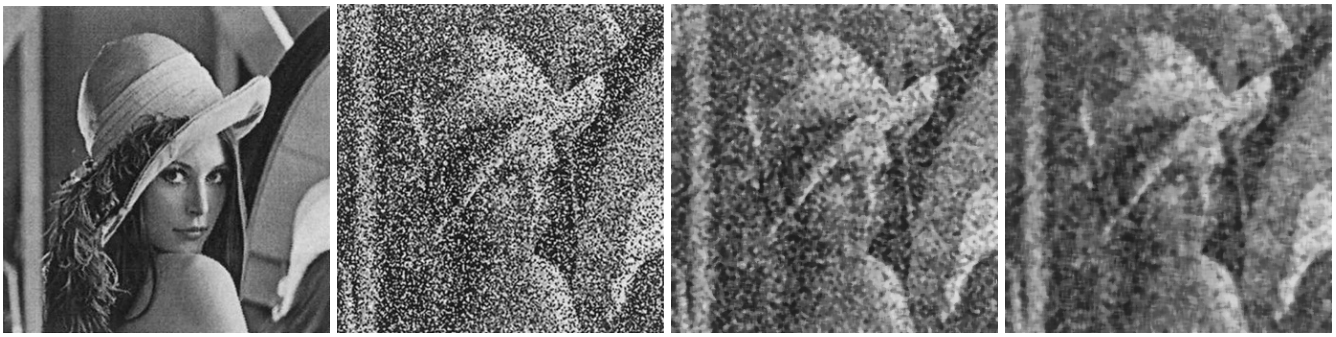
Task 3:

In the third task we had to create a median filter. I encountered some difficulties with c++ vectors but they were fast to solve.

The Median filter was very effective to remove both salt and pepper noises from the astronaut image. The results with kernel size 5 and 7 are shown below with the original and corrupted image.

a) Original b) Corrupted c) size 5 d) size 7

The Median Filter was very effective also on the Lena image. This filter is capable of filtering very strong noises. The results with kernel size 5 and 7 are shown below with the original and corrupted image.



a) Original b) Corrupted c) size 5 d) size 7

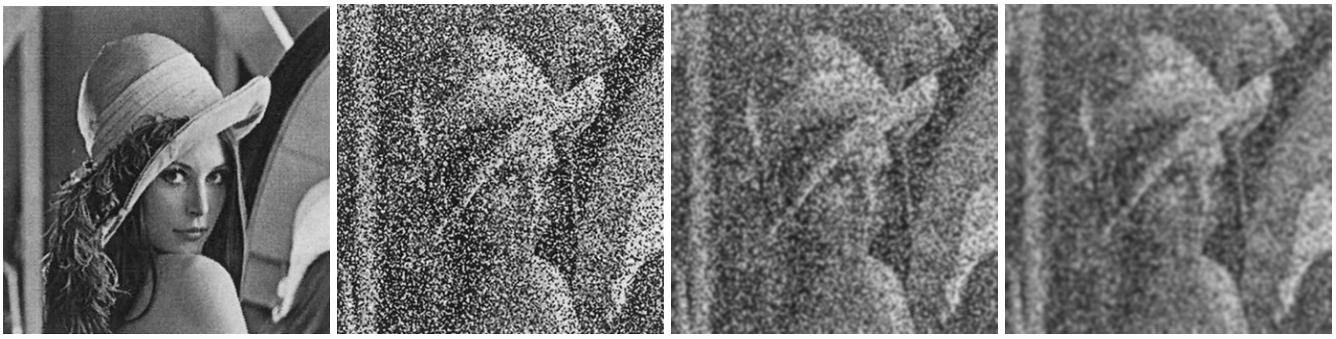
At the same time this filter was not capable of removing the cables from the Garden grayscale image with kernels lower than 13 (the image gets very blurred but the cables are still visible). I didn't manage to try higher values because the calculations were above my hardware capabilities. Probably the algorithm I created is anyways optimizable to reach faster calculations.

Task 4:

This task was about finding the Gaussian smooth openCV function.
The Gaussian Filter function that I found and used is GaussianBlur(). This filter is not very good for removing faint salt and pepper noises as we can see in the Astronaut image. The results of this filter are shown below.

a) Original b) Corrupted c) size 5 d) size 11

At the same time this filter is very good when removing very strong salt and pepper noises as we can see in the Lena images below.

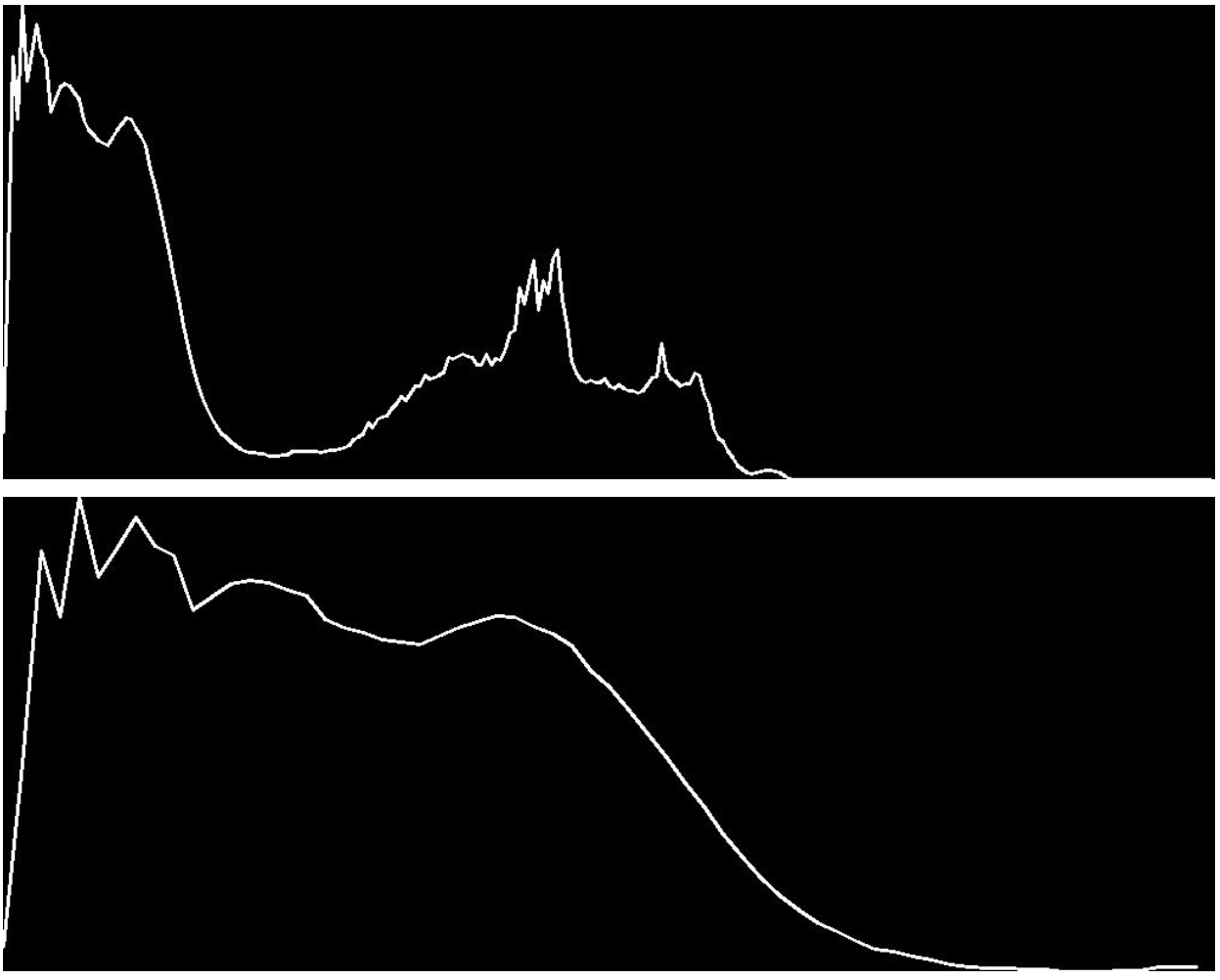


a) Original b) Corrupted c) size 7 d) size 11

This filter, as the median filter, is not effective for removing the cables of the Garden grayscale image.

Task 5:

This task asked us to plot the histogram of the Garden grayscale image. I had some difficulties in familiarizing myself with the openCV function calcHist() and in the plotting of the results. The histograms obtained are shown below, the first one with 256 bins and the second one with 64 bins.



Task 6:

The last task was about equalizing the Garden grayscale image histogram. The histogram obtained has continuous spikes that I'm not able to explain yet. The obtained histogram and the resulting image are shown below.