
# Department of Computer Science

## Digital Image Processing

## CS-371

**Assignment 3 - Image Filtering**

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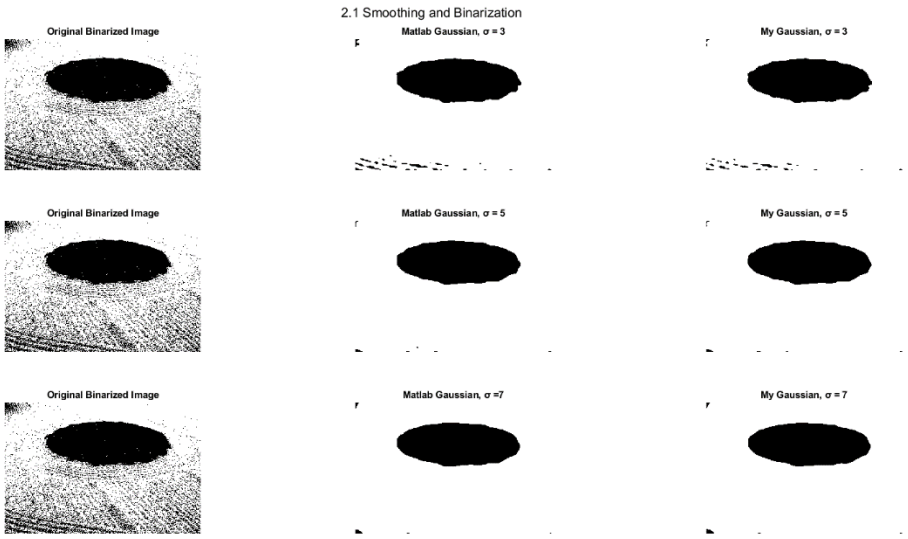
### 2.1 Comparison between Binarized Smoothed Images (both implementations), with the Binarized Original Image:

As we can see the part of the image that we would like to recognize and isolate from the whole image is the big black circle. The Original Binarized Image (without smoothing) has a lot of noise as we can observe from the picture 1.1 below. We would like to get rid of that noise and that's why we are using Smoothing in our Binarized Image. In this case we are using the "Replicate" method. In this method we can see that in both implementations (Matlab's and my implementation) we have pretty good results, because noise is evidently reduced. As we can observe, the standard deviation parameter having a big impact in both methods and as it's getting bigger the noise gets even more reduced. Probably, if we choose a really large value for σ then the small noisy parts on the edges of the image could have disappeared.




**(2.1). Smoothig and Binarization with 3 different "σ" values on the 1st image of the Dataset.**

## 2.2 Comparison between Binarized Filtered Images (both implementations), with the Binarized Original Image:

In this part we used Local Standard Deviation and Binarization. As we can clearly see, the biggest difference between Original Binarized Image and Binarized Filtered Images is that the black-white colors are reversed. In this case we can observe some details better in the Original Binarized Image, like the lines on the shutters and the bars on the ground floor of the building. On the other hand, with the Binarized Filtered Images we can see more clear the lines of the bricks in the building, as well as the cracks in the pillars of the building.


**(2.2). Local Standard Deviation and Binarization on the 2nd image of the Dataset.**

## 2.3 Comparison between Binarized Filtered Images (both implementations), with the Binarized Original Image:

On the last part of this assignment, we use an approximation of the Laplacian of Gaussian Filter in the last image of our Dataset. We can see that in the Original Binarized Image, there are some black lines that prevent us to read the plate. To make the image and make the lines disappear we use the Laplacian of Gaussian Filter. As we can observe now the content of the plate is readable. As the σ parameters is getting larger the central characters of the image are getting filled slowly with white color and they become more noticeable than the others. But as we can see when the σ value getting larger the other characters of the plate on the bottom and on the top are getting really hard to read (especially when the value is 2 times the square root of 2) and the border of the image is disappeared when the σ value is equal to 2.


**(2.3). Laplacian and Binarization on the 3rd image of the Dataset.**