# FUNDAMENTALS OF IMAGE PROCCESSİNG

Spring 2018-2019 Homework Assignment 1

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Some explanations:

İ=image

g=grayscale of image

gsp=salt&pepper noised grayscale image

gg=gaussian noised grayscale image

agsp=average of salt&pepper noised grayscale image

agg=average of gaussian noised grayscale image

## Part 1

I used 1 percent noise for salt and pepper noise by using this mask code: "`noise=randi([0,99],size(g));`"

figure 1: **Salt & Pepper noise added image**

figure 2: **Avarege of 4 Salt and Pepper noise added Image**

Figure 3: **Avarege of 16 Salt and Pepper noise added Image**

figure 4: **Gaussian noise added image**

figure 5: **Avarege of 4 Gauassian noise added Image**

figure 6: **Avarege of 16 Gauassian noise added Image**

The first thing i realized that the image avarege of the 16 image added gaussian noise is much better than the image avarege of the 16 image added salt & pepper noise. That is why i checked the differences between these two image with “imabsdiff()” function and see how different are they. Here is the result;

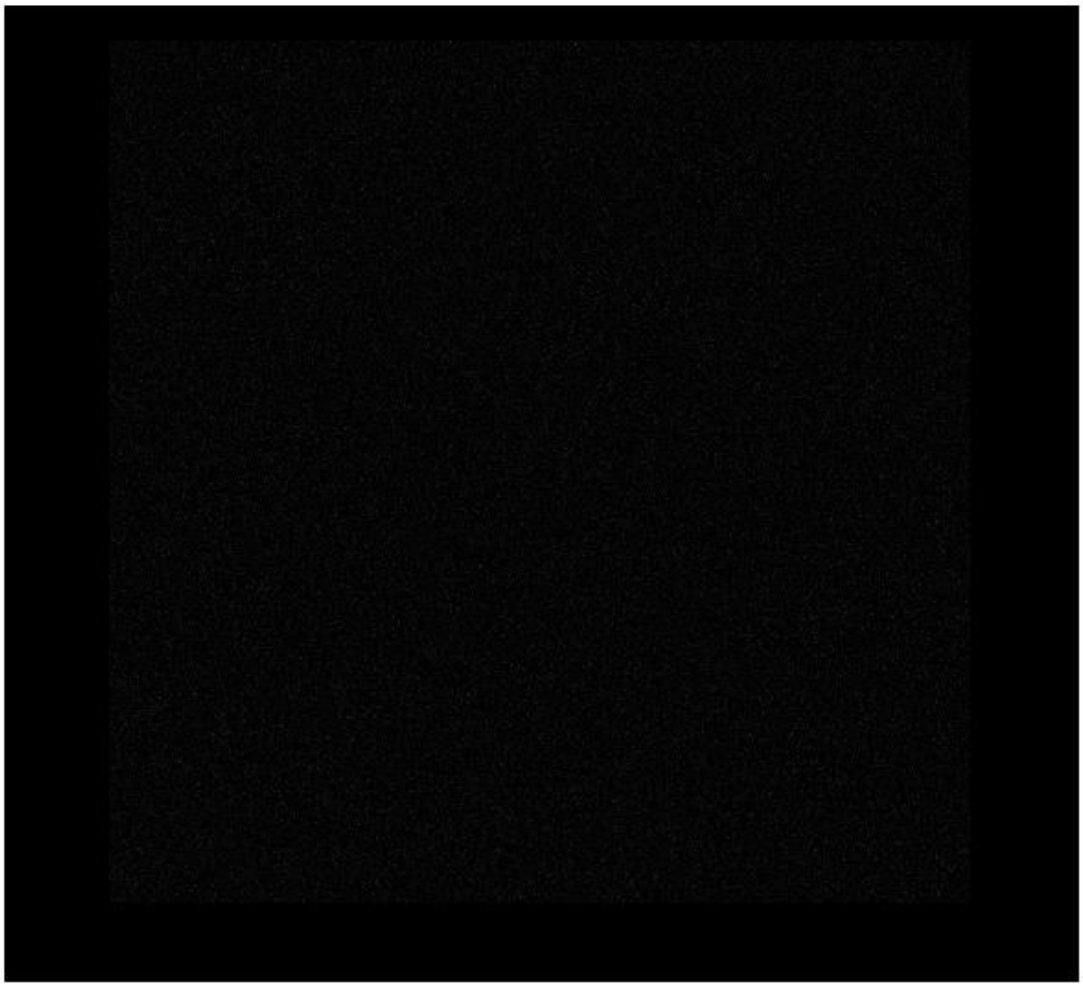


Figure7: **The Difference Between Gaussian and Salt and Pepper Denoised Images by Taking 16 Noised Images's Average**

The White points are mostly the pixels that couldn't be smooted by taking avarege of 16 salt & pepper noised image.

And of course as the numbers of the noised images we take increase, the avareged image is being smoother and less noisy. For axempe, when i take avarege of 1000 noised image, the output is pretty close the original grayscale image. Here is the output;

Figure8: **The avarege of 1000 salt&papper noised image**

## Part 2

H = fspecial(TYPE) => creates a two-dimensional filter H of the
specified type. Possible values for TYPE are:

'average' averaging filter
'disk' circular averaging filter
'gaussian' Gaussian lowpass filter
'laplacian' filter approximating the 2-D Laplacian operator
'log' Laplacian of Gaussian filter
'motion' motion filter
'prewitt' Prewitt horizontal edge-emphasizing filter
'sobel' Sobel horizontal edge-emphasizing filter

filter2 =>Two-dimensional digital filter.

Figure9: **The avareged salt&papper noised image**

Figure10: **The avareged gaussian noised image**

It looks like that the avereging filter is making images blur.

The noised salt and pepper averaging filter result is not good, because the nioses are still can be seen almost as they are, at the same time image is worse becuse of blurring.

For he gaussian nooise averaging, the avareged image is much better than the gauassian noised image. The noise is not visible but just a little bit blurred og the original grayscale image.

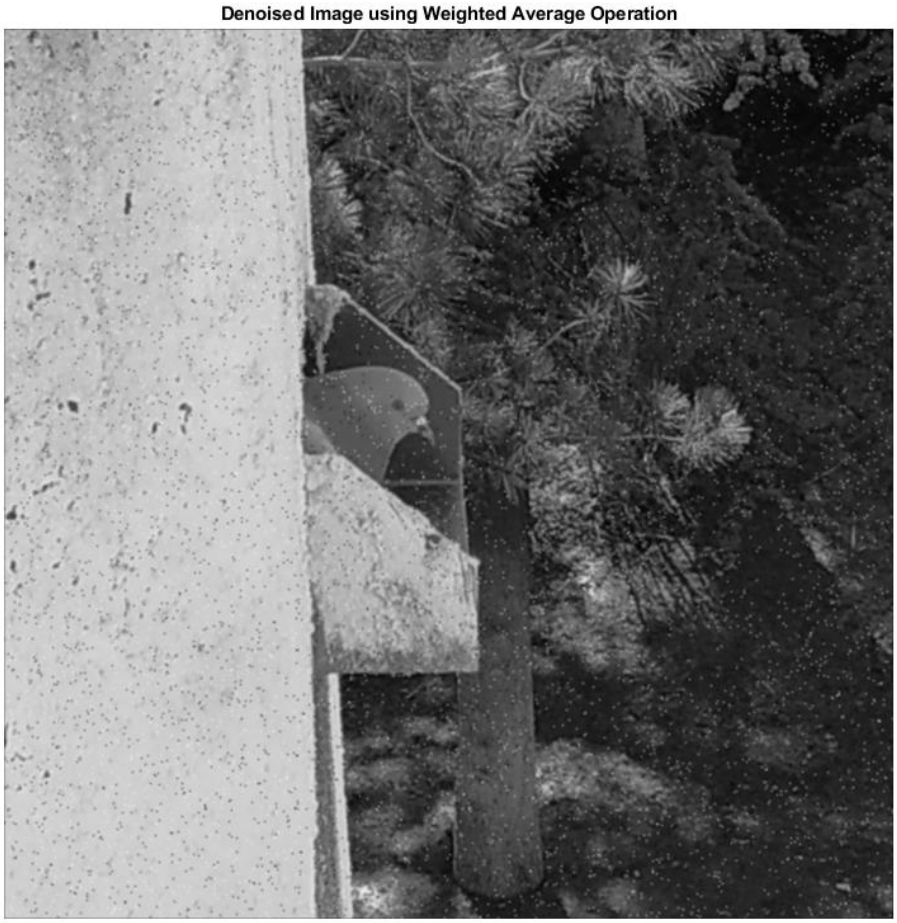



Figure11: **The weighted avareged salt and pepper noised image**

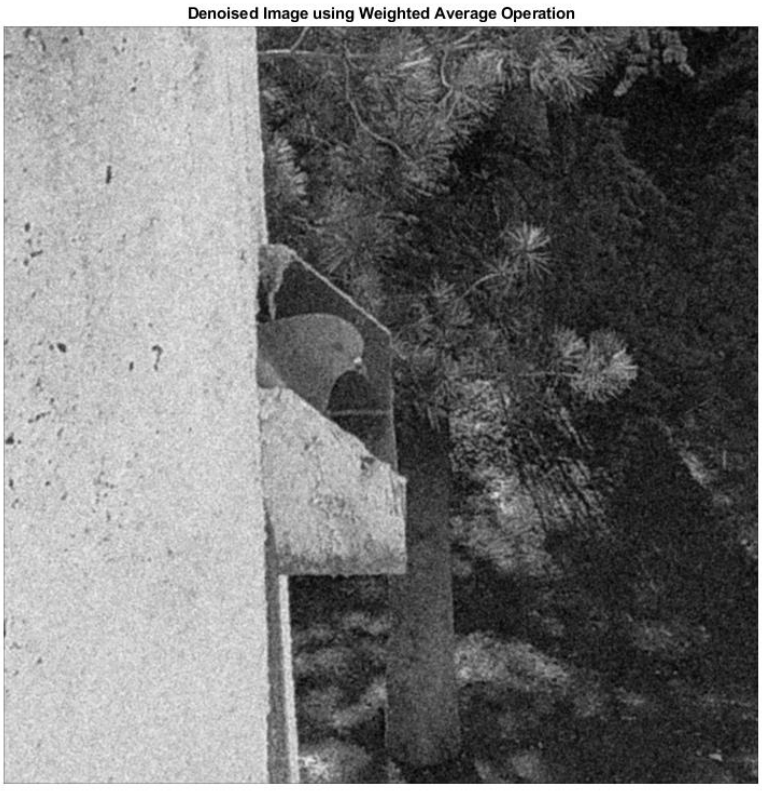



Figure12: **The weighted avareged gaussian noised image**

The weighted averaged salt and pepper noised image result is much better than the avared one. The bluring effect is greatly gone. Fort he gaussian one,again the weighted average result is better.

## Part 3

The results of the part 1 have better conditions thsn the second part's operations.

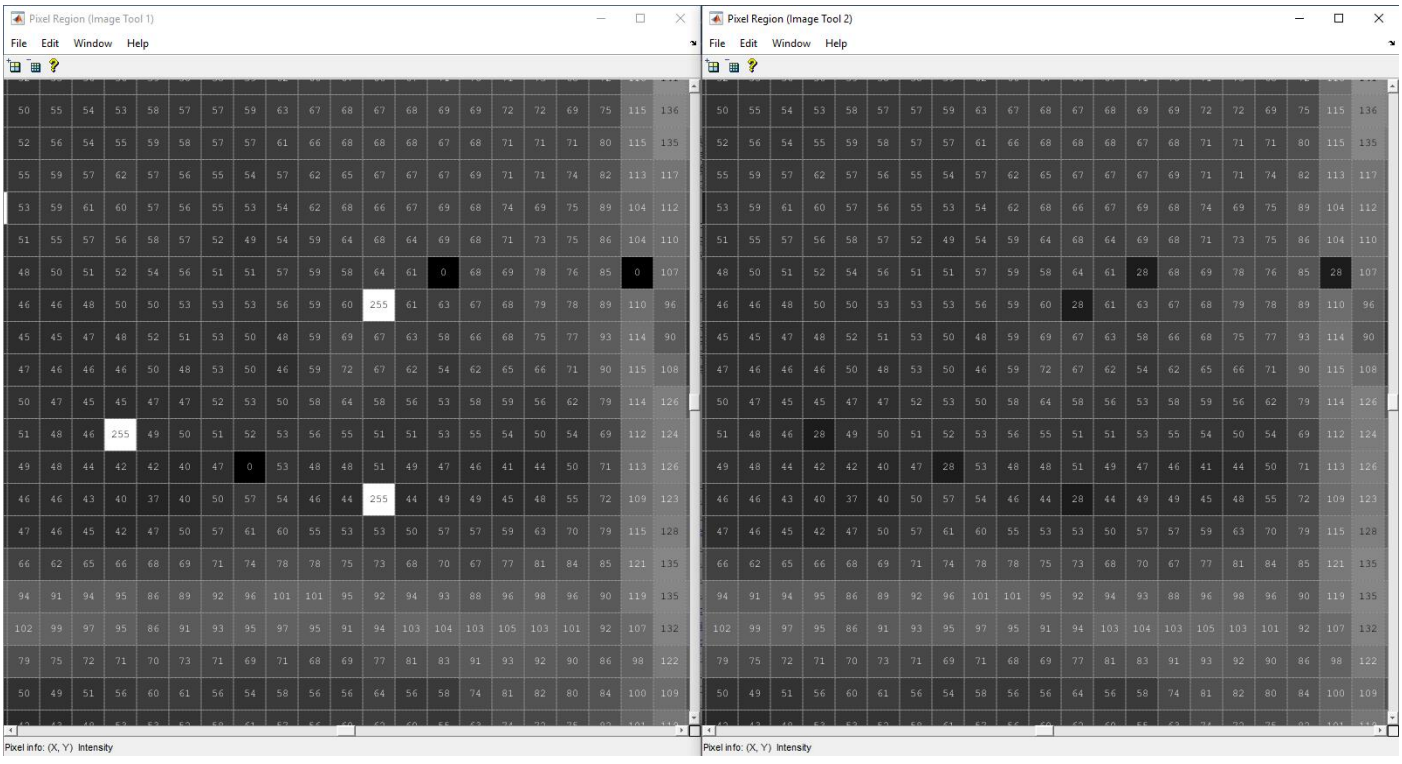
The gaussian noise is seems to disrupt the image as whole, but the salp and pepper noise is seems to disrupt the image partialy. In salt and pepper noise, i feel like i can still see the true image, but for gaussian noise, i can't imagine the true image. It makes me feel that the image was always like that.

Taking average of lats of noised image is working best. But i guess we must consider that in that way we have lats of data, but in the averaging, we are having the result over only one image. The more data, the better result.

I have a suggestion for denoising the salt and pepper noised images;

We will consider and process pixelwise.

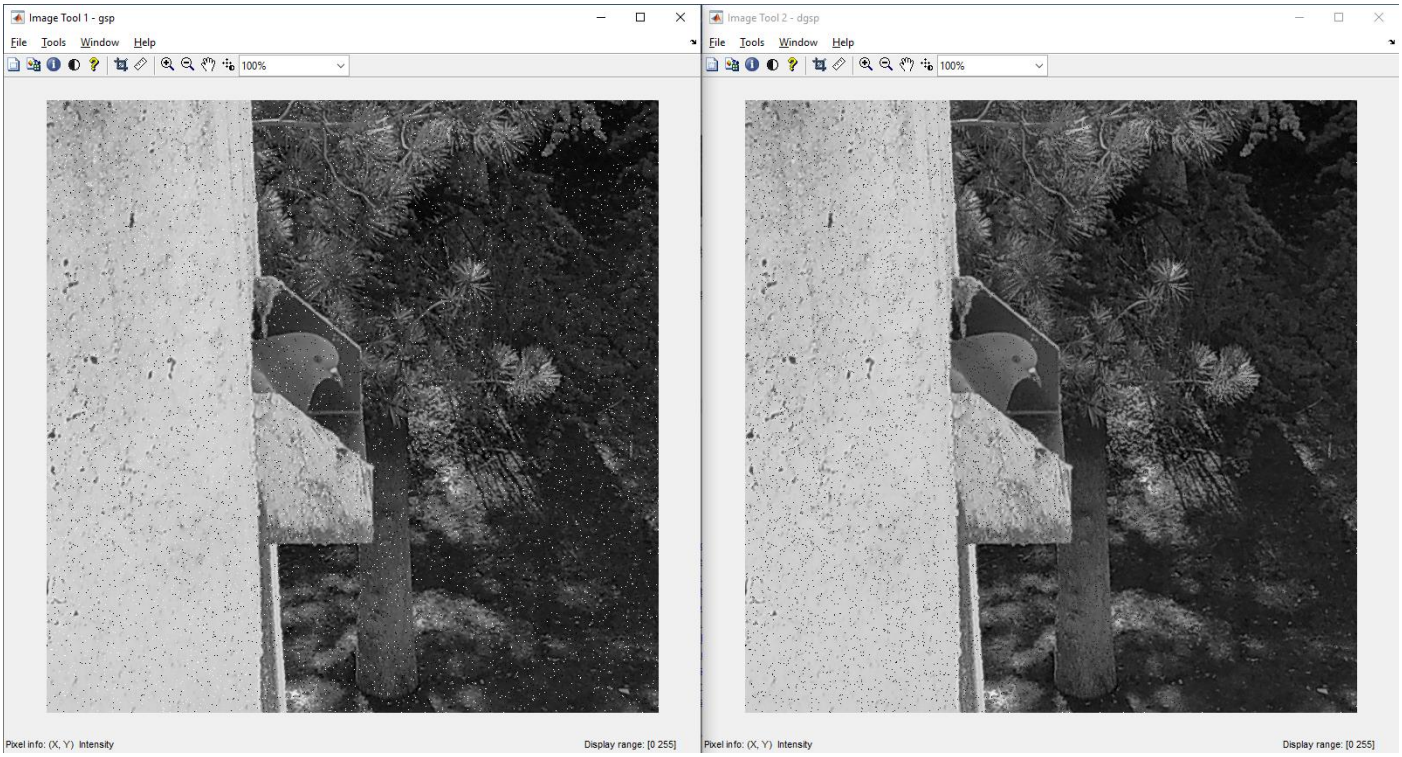
If the value of the pixel is not 0 or 255, no operation. Otherwise we will consider(get into the calculation) the neighbor pixels that aren't 0 or 255 and take the average of the rest of the pixels.




When i code what i tought, i notice that my code makes every pixel that has value of 0 or 255, 28. I couldn't understand the reason.

There is visible correction but in real there is not.

Here the full images;




It seems like the salt noises are gone but the peppers ones remain, but in a way actualy the salts are becoming peppers.

## References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- https://www.mathworks.com/help/matlab/ref/saveas.html
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- https://www.imageeprocessing.com/
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- https://stackoverflow.com/questions/31834803/how-to-add-5-percent-gaussian-noise-to-image
- https://www.mathworks.com/matlabcentral/answers/27899-or-statement-using-if-operator
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