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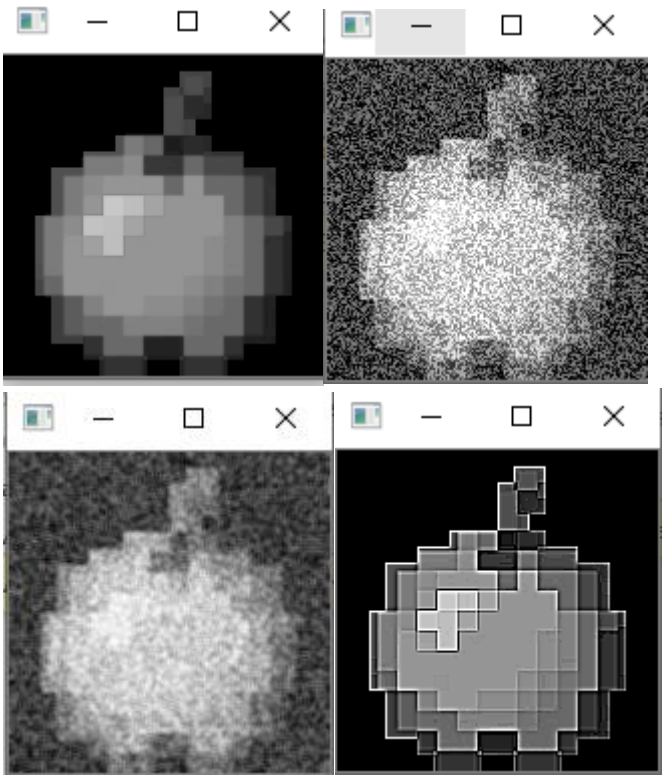
Artificial Intelligence and Computer Vision Lab
Homework 5

1. filtering of Gaussian noise:

   - for low frequency image we have the following results:
   (top left is the original image, top right is with added noise, bottom-left is with added gaussian blur and bottom-right is the version with noise but sharpened)



For low frequency image, quality after filtering is visibly bad, even after applying the gaussian blur. After sharpening frequency has been increased one can notice lines in the image.
In my case the sharpened image looked more familiar to the original image, however the presence of lines was much more visible to the eye.

- for high frequency image the results were a bit different:

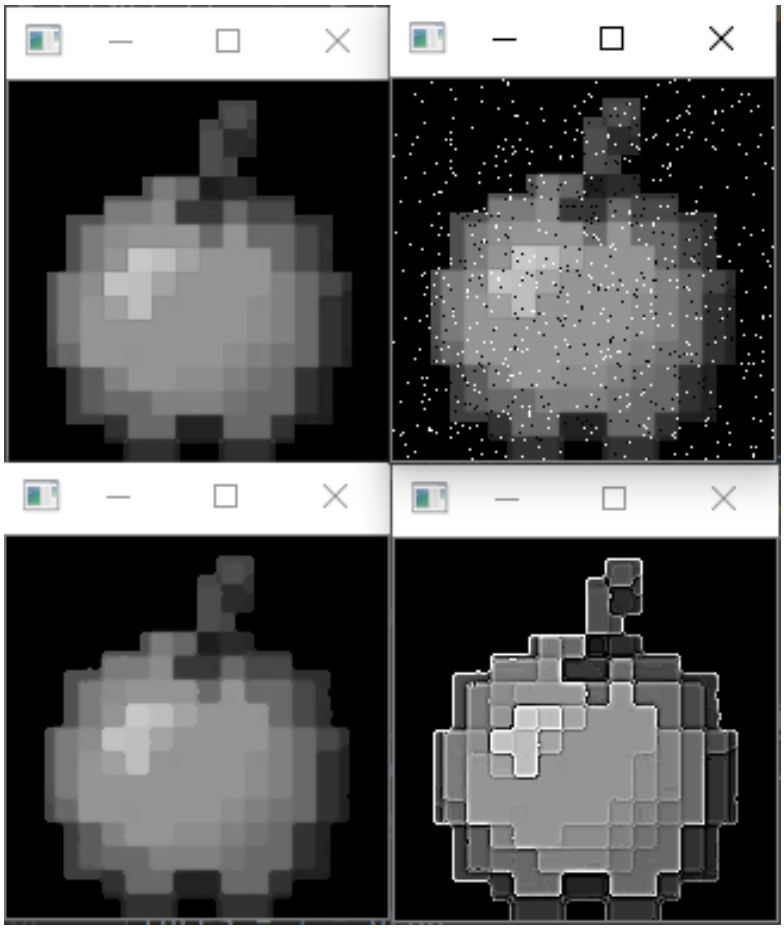
(top left is the original image, top right is with added noise, bottom-left is with added gaussian blur and bottom-right is the version with noise but sharpened)

In the high frequency image one can notice that the filtering is not as eye gauging, it is miles better than the low frequency example. The details are still more distinguishable, with blur added or without. The sharpening makes the image appear more „clear” to the eye, however with one drawback, if one were to zoom in closer to the image then one can notice that the edges appear more pixelated than prior to applying the sharpening.

2. filtering of salt and pepper noise:

- for low frequency image:

(top left is original image, top right is with salt and pepper, bottom left is with added blur and bottom right is with sharpening)



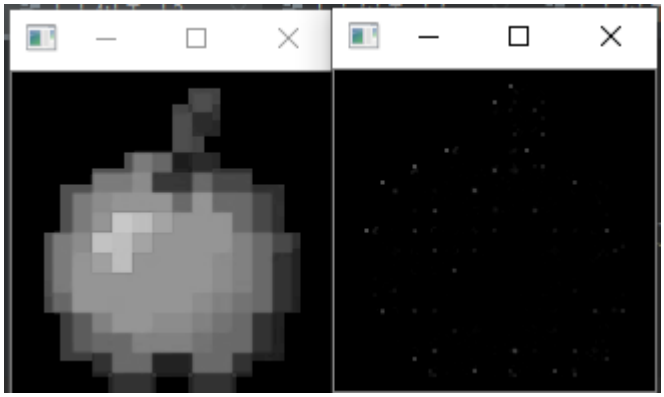
In low frequency image filtering altered the frequency but overall quality of image seem to be good. Sharpening of the image leaves clearly visible line segments on the image.

-for high frequency image:

For high frequency one can see that the filtering is a bit worse, the image seems to have been pixelated, there are visible edges.

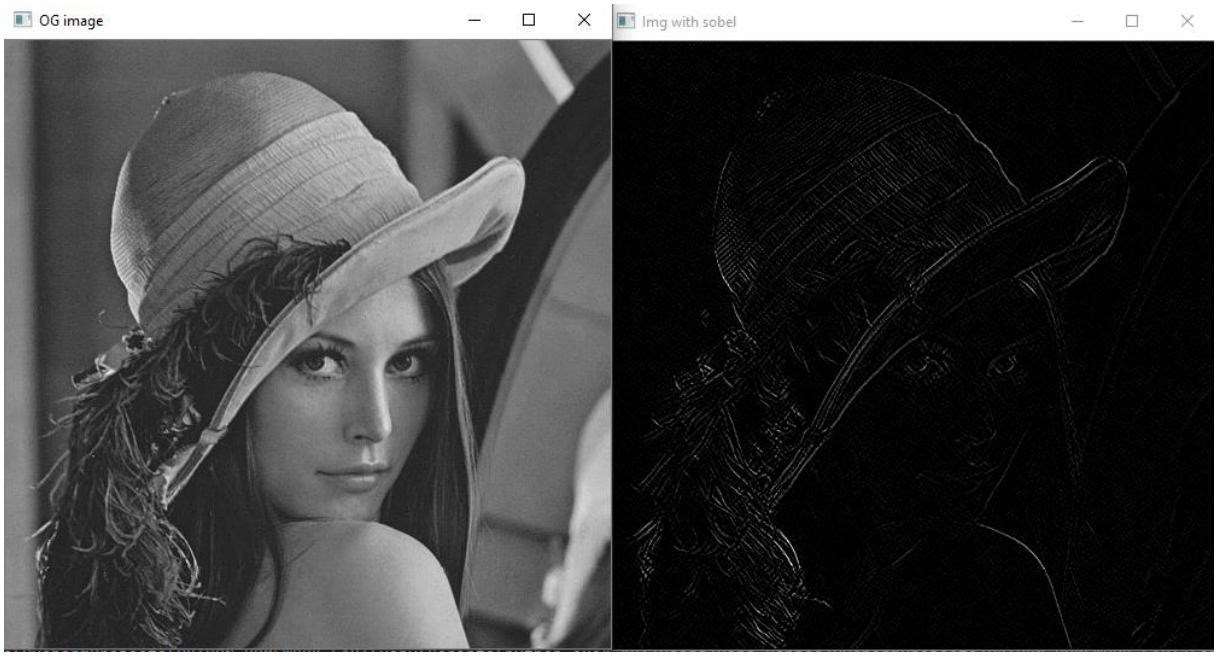
3. edge detection using Sobel filters:

- for low frequency image:



The image is barely visible after applying the sobel filters.

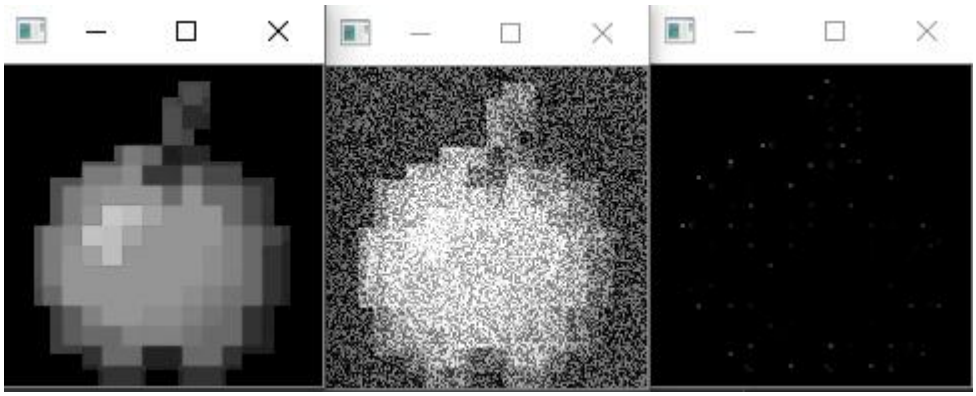
- for high frequency image:



The image is much more visible than low frequency image, however in my case it does not show every element of the image (from online resources I have seen better results, even after playing with the code), one can see the edges as they are the most visible elements.

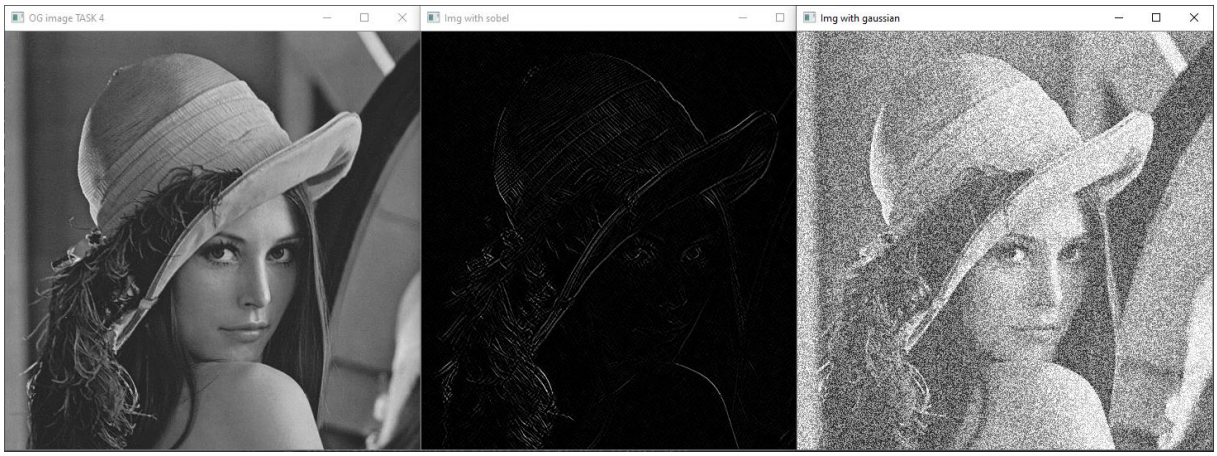
4. edge detection using a Sobel filters for images with Gaussian noise:

- for low frequency image:



When it comes to low frequency image, one can see that the gaussian noise applied really blends everything together and the noise makes everything hard to decipher. Even with the noise the sobel effect remains unaffected and is pretty much the same as in the task before, for low frequency the image is barely to almost not visible at all.

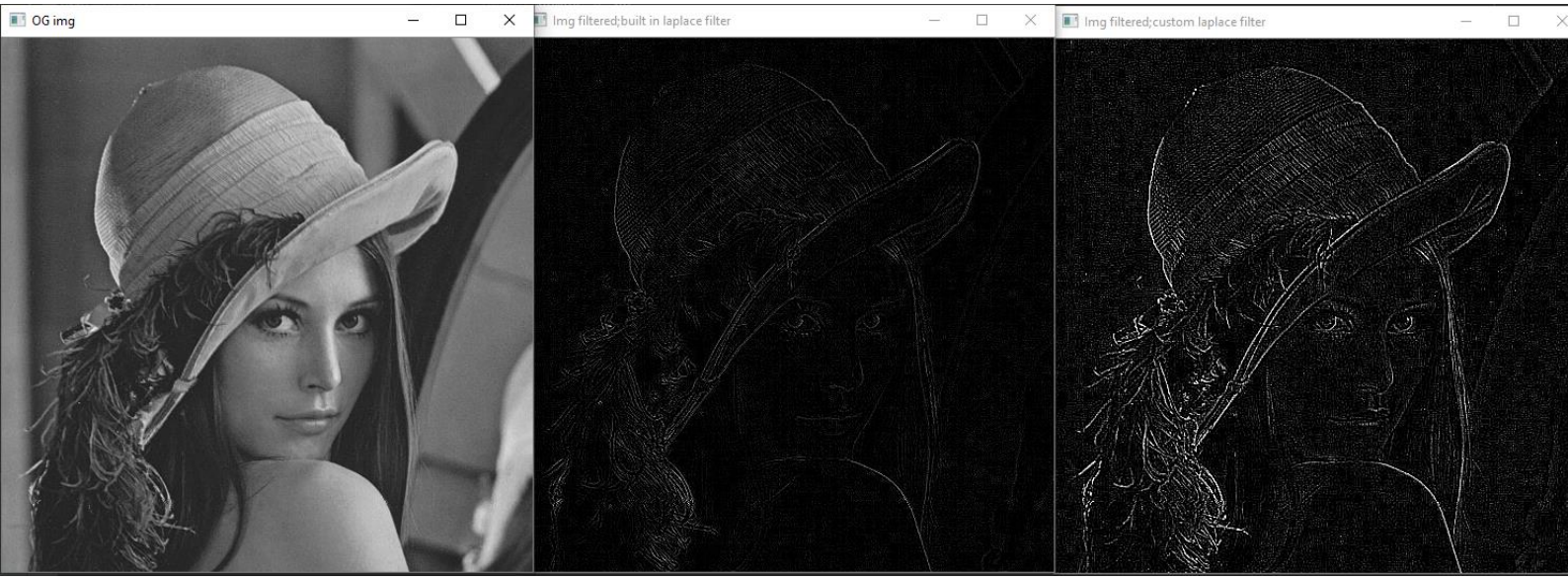
- for high frequency image:



In this case even though image is disturbed by gaussian noise visible in the third window above, for the sobel filter can still show almost all important edges like in the previous task.

5. edge detection using a custom written Laplace filter:

Using a high frequency image here are the results:



For this image one can notice that for the built in filter the effect is much smoother and cleaner, one can see only the outlines of the image presented.
The custom filter has a lot more going on, the image is much sharper and the noise is more bold and visible. One can argue that it is worse but in my opinion I prefer the custom one just because there is more detail visible in my case, I can read much more from this image.