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CS390S
Homework 4
13 October, 2019

Homework 4 Report

Base Image:

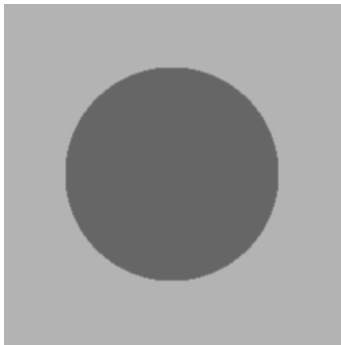


Image with Gaussian noise and its histogram:

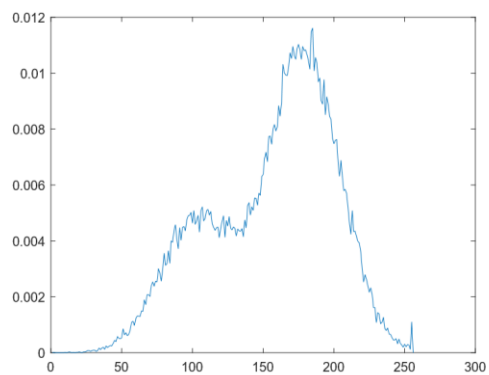
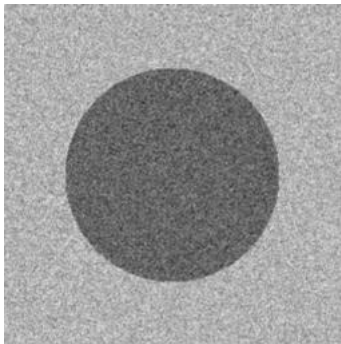


Image with Uniform noise and its histogram:

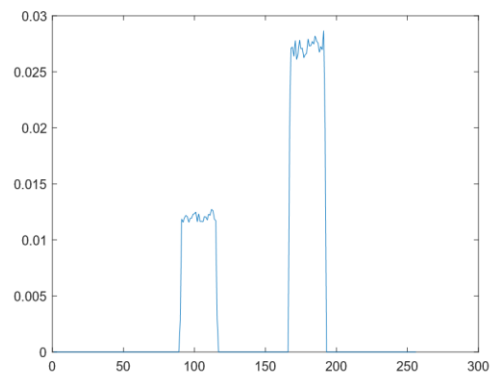
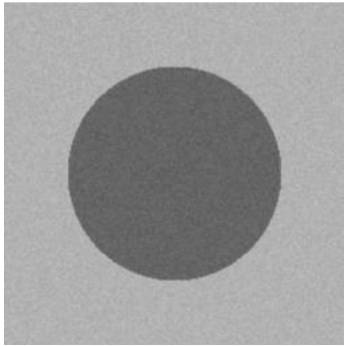


Image with Salt & Pepper noise and its histogram:

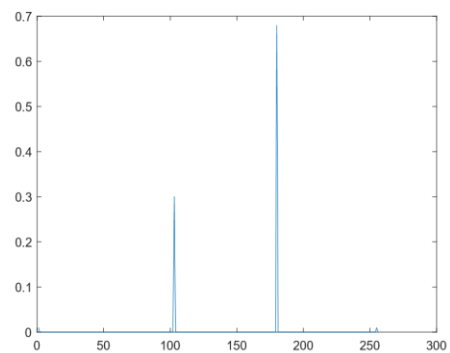
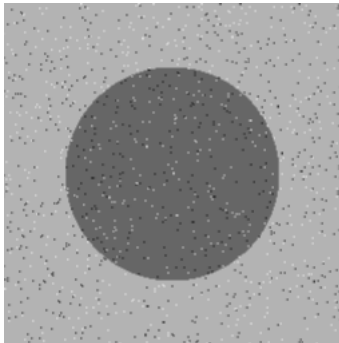


Image after removing Gaussian noise with Wiener filter followed by a Median Filter:

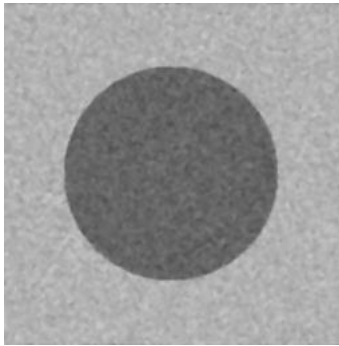


Image after removing Uniform noise using Wiener filter five times in succession:

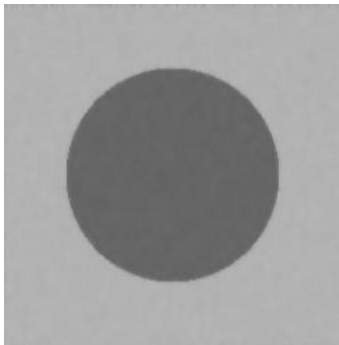
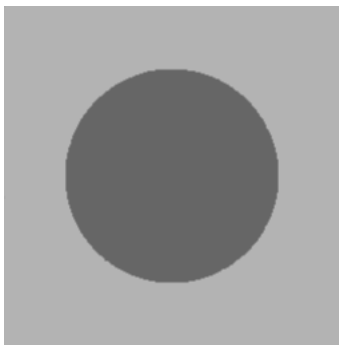


Image after removing Salt & Pepper noise using Median filter:



Discussion:

I was a confused on what we were allowed to do and were not allowed to do with the restrictions placed on us for this assignment. After reading it carefully, I determined that we *were* allowed to use the function `imnoise()` and the referenced code `imnoise2()`.

I had an easy time adding noises to the images because we were permitted to use the `imnoise()` and `imnoise2()` functions to add the gaussian, uniform, and salt&pepper noises.

In order to create the histograms, I used `myhist.m` from the previous project after converting the image to `uint8`. I thought it was very neat to see the differences of each histogram, and it gave me a better understanding of how uniform distribution works.

To remove the noise, I first started with the salt & pepper noise, because it was conceptually the easiest to fix. We just needed to remove pixels with either extremely high and low intensities from the image, so I used the median filter to do it. It worked flawlessly. Then, I looked into the Gaussian noise. I remember in the in-class lecture that using the Wiener filter was recommended, so I used that first. However, it still contained a good amount of noise, so I used the median filter to smooth out the image and reduce the noise. Although it was not perfect, other filters could not reduce the noise any further. Finally, for the uniform noise, I also decided to use the Wiener filter. I noticed that the more I used it, the smoother it became, so I experimented with using it multiple times and choosing the one which yielded the perfect balance of smoothness and sharpness: five times.

Overall, I thought that this assignment was very useful in understanding the application and the concept of manipulating different types of noises.