

Lab 6 Frquency Domain Filtering

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Course: *LAB Session I* – Professor: *YU Yajun*

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Introduction

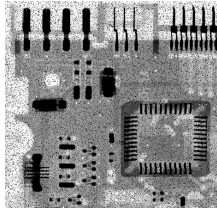
The objective of restoration is to improve a given image in some predefined sense. Compare with image enhancement which is largely a subjective process, image restoration is for the most part an objective process. When we apply image restoring to a degraded image, we will first construct a model about how the image was degraded and then we apply the degrade filter to the restoring filter. After that we could get the reconstructed image, however, we can't build the degrade model precisely and there may be some overlap in frequency domain after the image was degrade, so we can not always restore that image like what it used to be.

In this lab, there are three tasks will be performed.

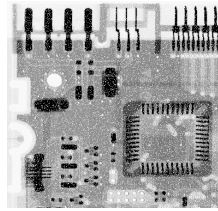
1. Apply adeptive filter to the image with high noise intensity
2. Apply full inverse filtering, radially limited inverse filtering and Wiener filtering to a image degraded by atomsphere turbulence. Discuss how the parameters, if any, are determined, and the different effects by using the different algorithms.
3. Restore a image degraded by motion blur and noise.

Task I: Adaptive Filter for Image Denoising

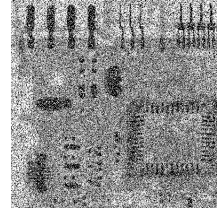
Remove the noise from the input images Q6_1_1.tif, Q6_1_2.tif, Q6_1_3.tif and Q6_1_4.tif. Explain your observation and the method used to each of the images, and why such methods are used.



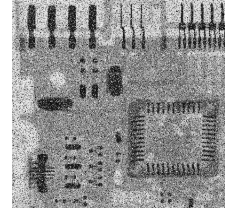
(a) Q6_1_1



(b) Q6_1_2



(c) Q6_1_3



(d) Q6_1_4

Figure 1: Task I, Figures with noise

Analysis.

Task II: Image Restoration

Image Q6_2.tif was degraded from an original image due to the atmosphere turbulence given on slide 65 with $k = 0.0025$. Restore the original image from the input Q6_2.tif by using full inverse filtering, radially limited inverse filtering and Wiener filtering. Discuss how the parameters, if any, are determined, and the different effects by using the different algorithms.

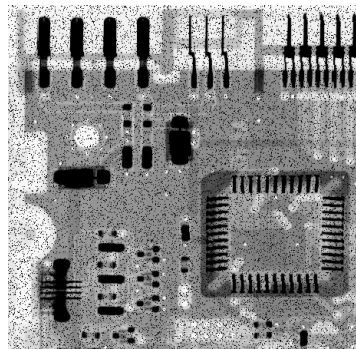


Figure 2: Q6_1_1

Task III: Motion Deblurring

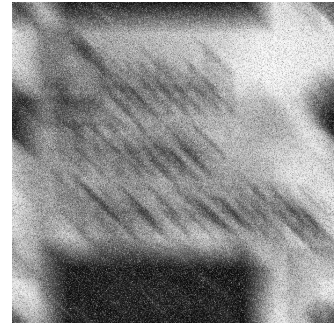
Restore the original images from the inputs Q6_3_1.tif, Q6_3_2.tif and Q6_3_3. Explain your observation and the method used.



(a) Q6_3_1



(b) Q6_3_2



(c) Q6_3_3

Figure 3: Task III, Figures with motion blur

Conclusion