CS 4650 - Digital Image Processing

Homework 2: Adaptive Median Filter

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Abstract

In this assignment, images containing noise were put through an Adaptive Median Filter function in an attempt to reduce, or remove entirely, said noise. In addition, these images were put through this function twice, once with a smaller Smax value of 9, and once with a larger value of 21. This project was completed using C++.

Introduction

Breaking this assignment down into smaller parts, the first step in completing this assignment was to implement an Adaptive Median Filter solution. Once functional, the solution required some optimization as it took far, far too long to finish on larger images, such as the ABQ image provided for this project. With the more optimized function done, the last step was running the program on the input images. This yielded both the timing of the function for each image, as well as the final filtered images.

Experiments and Results

- **Input Images (No Noise)**


- **Peppers Smax = 9, time was 2 seconds.**


^ Image before filtering @ Smax = 9

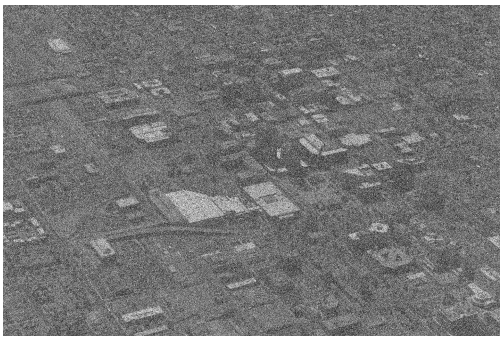
^ Image after filtering @ Smax = 9

- **Peppers Smax = 21, time was 2 seconds.**


^ Image before filtering @ Smax = 21

^ Image after filtering @ Smax = 21

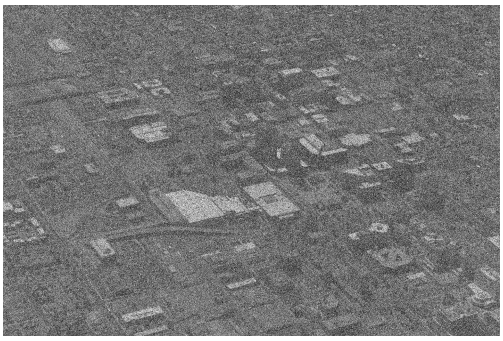
- **ABQ Smax = 9, time was 422 seconds (Roughly 7 minutes).**



^ Image before filtering @ Smax = 9

^ Image after filtering @ Smax = 9

- **ABQ Smax = 21, time was 477 seconds (Roughly 8 minutes).**



^ Image before filtering @ Smax = 21

^ Image after filtering @ Smax = 21

## Conclusions

This solution, while quite slow on larger images, works as expected and removes noise that plagues images. It's relatively simple to implement and very effective if done properly. It would be interesting to try this algorithm on images with more noise to see how well it would work. Overall, this assignment was very interesting and eye opening to the power of these kinds of algorithms when attempting to transform images from unreadable to nearly error-free.

## References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