

Median Filtering in Algebraic Reconstruction Methods

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The main task of image reconstruction is to create the 2D image of a cross-selection of an object from its projections. Algebraic methods can provide good solutions if only few projections are available. However, these methods – especially the Algebraic Reconstruction Technique – create noisy images if the iteration number or the computational time is limited.

In this presentation, we show how to decrease the noise in the resulted image using median filters during the reconstruction. Median filters are common tools in image restoration to decrease salt-and-pepper noise in a digital image without blurring the edges.

For testing we implemented the Algebraic Reconstruction Technique, the Simultaneous Iterative Reconstruction Technique (continuous reconstructions) and the Discrete Algebraic Reconstruction Technique (binary reconstructions). For median filtering we used Simon Perreault's implemented algorithm [1]. Our artificial test images contained homogeneous regions with different levels of topology. During the reconstruction we implicitly searched for an optimal parametrization of the filtering. We discuss the developed methods and present the experimental results, consequences and future plans as well.

References

- [1] S. Perreault, P. Héber: Median filtering in constant time. *IEEE Transactions on Image Processing*, 16 (2007), 2389-2394.