

Moment Methods in Tomography

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Filtered backprojection (FBP) and iterative reconstruction transform (IRT) methods are the standard and highly developed methods to reconstruct tomography images from their Radon transforms. These methods rely on the Fourier transform and use of filters and other image processing methods to achieve their intended goals.

Moment methods to reconstruct images from their Radon transforms are relatively new but promise to provide more efficient and highly adaptable approaches to image reconstructions. In this talk, we describe moment methods, compare them to FBP and IRT methods, establish a modified Radon transform (MRT) via convolution with a mollifier and obtain its inversion formula. The simple relationships between the coefficients in moment methods and in modified moment methods suggest natural commutativity relationships in K-space that can be exploited in practice. The reconstruction algorithm is implemented, and a simple density function is reconstructed from moments of its modified Radon transform. Numerical convergence of this reconstruction is shown to agree with the derived theoretical results.

This is joint work with Professor Robert Mnatsakanov, Victor Ginting and Hayoung Choi.