Optimisation methods for tomography

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Abstract

In this talk we will introduce optimization methods for tomographic reconstruction. In this talk we will cover the following topics:

- Motivation: tomography as an inverse problem

- Introduction to optimisation: Objective function; Constraints; Statistical interpretation; Maximum Likelihood (ML) and Maximum a Posteriori (MAP) models.

- Optimisation and tomography: Inverse problems formulation; Simple solutions: least squares; Filtered Back Projection as a ML formulation; Algebraic methods as a MAP formulation; Regularization functionals; sparsity; Total Variation.

- Applications: Joint denoising and tomography; Sparse reconstruction; Join segmentation and reconstruction; Local tomography.

- Software packages : Python, Matlab, C++, Fortran packages for optimization. Dedicated tomography packages.

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