Sparse and Co-Sparse Tomographic Recovery from Few Projections

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The problem of reconstructing three-dimensional volume functions from few projections is important for a number of industrial problems. Methodological research has mainly focused on combinatorial approaches of discrete tomography that do not scale well with the problem size. In our recent work, we adopted the alternative viewpoint of compressive sensing and the gap to the corresponding theory caused by sensor matrices of our scenarios that violate basic assumptions. The talk focuses on recent progress in this connection resulting in recovery guarantees that enable quantitative predictions for applications. Challenges from the viewpoint of large-scale mathematical programming will be sketched as well as extensions to dynamic scenarios in our future work and related mathematical problems.