Reconstruction of 2D Binary Objects from a Few Fan-Beam Projections

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This paper studies the reconstruction of the binary matrices from limited number of fan beam projections. The reconstruction of the binary object is carried out by optimizing the mean square error between the projections and the given measurement data.

The minimization method is based on simulated annealing. The implementation of this algorithm contains different kind of speed up features. We are going to show that if we use pyramidal resolution approach, it will improve the speed of this algorithm.

In this paper, we are going to analyze the results of this reconstruction method from different viewpoints: changing parameters of the fan beam projection, different optimization parameters, and the complexity of the binary images.

Finally, we will demonstrate, that using this discrete tomography method for discrete objects we get better result then the traditional reconstruction algorithms (e.g. filtered backprojection).