E. Garduño, R. Davidi and G.T. Herman, Reconstruction from a few projections by $\ell_1$-minimization of the Haar transform, *Inverse Problems*, Vol. 27, 055006, (**2011**). DOI:10.1088/0266-5611/27/5/055006.

Abstract

Considerable recent activity is aimed at reconstructing images from a few projections. Images in any application area are not random samples of all possible images, but have some common attributes. If these attributes are reflected in the smallness of an objective function, then the aim of satisfying the projections can be complemented with the aim of having a small objective value. One widely investigated objective function is total variation (TV), it leads to quite good reconstructions from a few mathematically ideal projections. However, when applied to measured projections that only approximate the mathematical ideal, TV-based reconstructions from a few projections may fail to recover important features in the original images. It has been suggested that this may be due to TV not being the appropriate objective function and that one should use the $\ell_1$-norm of the Haar transform instead. The investigation reported in this paper contradicts this. In experiments simulating computerized tomography (CT) data collection of the head, reconstructions whose Haar transform has a small $\ell_1$-norm are not more efficacious than reconstructions that have a small TV value. The search for an objective function that provides diagnostically efficacious reconstructions from a few CT projections remains open.