Abstract

Image reconstruction from projections suffers from an inherent difficulty: there are different images that have identical projections in any finite number of directions. However, by identifying the type of image that is likely to occur in an application area, one can design algorithms that may be efficacious in that area even when the number of projections is small. One such approach uses total variation minimization. We report on an algorithm based on this approach, and show that sometimes it produces medically-desirable reconstructions in computerized tomography (CT) even from a small number of projections. However, we also demonstrate that such a reconstruction is not guaranteed to provide the medically-relevant information: when data are collected by an actual CT scanner for a small number of projections, the noise in such data may very well result in a tumor in the brain not being visible in the reconstruction.