Parametric Level Set Methods for Limited Data CT Image Reconstruction

Haytham A. Ali, and Hiroyuki Kudo

University of Tsukuba

Abstract:

Compressive sensing is known to be effective for reconstructing CT images from limited projection data in limited-angle CT and sparse-view CT. However, when the measurement conditions are insufficient, the image quality performance will be insufficient in addition to the long computational time. In this talk, we will present an image reconstruction framework that can dramatically improve performance by using prior knowledge about the density of images. Specifically, we formulate a convex optimization problem that can be stably and successfully solved based on an image model that expresses the boundaries of images as a level set consisting of linear combinations of dictionary elements. Also, we investigated two different methods for constructing the dictionary that determines the performance. As a result of simulation experiments using real data, the proposed method was able to reconstruct images with high image quality even in situations where the conventional method was ineffective.