Total Variation and Tomographic Imaging from Projections - DTU Orbit (16/12/2018)

Total Variation (TV) regularization is a powerful technique for image reconstruction tasks such as denoising, in-painting, and deblurring, because of its ability to produce sharp edges in the images. In this talk we discuss the use of TV regularization for tomographic imaging, where we compute a 2D or 3D reconstruction from noisy projections. We demonstrate that for a small signal-to-noise ratio, this new approach allows us to compute better (i.e., more reliable) reconstructions than those obtained by classical methods. This is possible due to the use of the TV reconstruction model, which incorporates our prior information about the solution and thus compensates for the loss of accuracy in the data. A consequence is that smaller data acquisition times can be used, thus reducing a patients exposure to X-rays in medical scanning and speeding up non-destructive measurements in materials science.

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