Convergence of iterative image reconstruction algorithms for Digital Breast Tomosynthesis - DTU Orbit (17/01/2019)

Convergence of iterative image reconstruction algorithms for Digital Breast Tomosynthesis

Most iterative image reconstruction algorithms are based on some form of optimization, such as minimization of a data-fidelity term plus an image regularizing penalty term. While achieving the solution of these optimization problems may not directly be clinically relevant, accurate optimization solutions can aid in iterative image reconstruction algorithm design. This issue is particularly acute for iterative image reconstruction in Digital Breast Tomosynthesis (DBT), where the corresponding data model is particularly poorly conditioned. The impact of this poor conditioning is that iterative algorithms applied to this system can be slow to converge. Recent developments in first-order algorithms are now beginning to allow for accurate solutions to optimization problems of interest to tomographic imaging in general. In particular, we investigate an algorithm developed by Chambolle and Pock (2011 J. Math. Imag. Vol. 40, pgs 120-145) and apply it to iterative image reconstruction in DBT.