

Sparsity Constrained Image Reconstruction for MRFM

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In this talk we will present sparsity constrained image reconstruction in the context of hierarchical Bayesian statistical inference. Penalized linear least squares methods, such as that of Ting et al (2009), achieve sparsity by implicitly assuming a prior density of pixel intensities with point mass at zero. This prior density has parameters that must be selected by the user such as the mean number of zeros in the image, the noise variance, and the variance of the non-zero valued pixels. By modeling these as random parameters with their own prior densities we obtain a hierarchical Bayesian model, such as that of Dobigeon et al (2009). Hierarchical Bayesian approaches often lead to image reconstruction algorithms that have improved stability with respect to user-specified tuning parameters. These algorithms will be illustrated and compared on simulated and real 3D MRFM data.