PERFORMANCE BOUNDS FOR CO-/SPARSE BOX CONSTRAINED SIGNAL RECOVERY

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Abstract

The recovery of structured signals from few linear measurements is a central point in both compressed sensing (CS) and discrete tomography. In CS the signal structure is described by means of a low complexity model like e.g. co-/sparsity. The CS theory shows that any signal/image can be undersampled at a rate dependent on its intrinsic complexity. Moreover, in such undersampling regimes the signal can be recovered by sparsity promoting convex regularization like e.g. ℓ_1 or total variation (TV) minimization. Precise relations between many low complexity measures and the sufficient number of random measurements are known for many sparsity promoting norms. However, a rigorous description of the undersampling rate for TV seminorms is still lacking. We address this issue by: a) providing dual certificates for testing uniqueness of a given cosparse signal with bounded signal values, b) approximating the undersampling rates via the statistical dimension of the TV descent cone and c) showing empirically that the provided rates also hold for tomographic measurements.