Title: *A new measure for measurement matrices in compressive sensing*

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Abstract

In this paper we introduce the q-ratio block constrained minimal singular values (BCMSV) as a new measure of measurement matrix in compressive sensing of block sparse/compressive signals and present an algorithm for computing this new measure. Both the mixed ℓ_2/ℓ_q and the mixed ℓ_2/ℓ_1 norms of the reconstruction errors for stable and robust recovery using block Basis Pursuit (BBP), the block Dantzig selector (BDS) and the group lasso in terms of the q-ratio BCMSV are investigated. We establish a sufficient condition based on the q-ratio block sparsity for the exact recovery from the noise free BBP and developed a convex-concave procedure to solve the corresponding non-convex problem in the condition. Furthermore, we prove that for sub-gaussian random matrices, the q-ratio BCMSV is bounded away from zero with high probability when the number of measurements is reasonably large. Numerical experiments are implemented to illustrate the theoretical results. In addition, we demonstrate that the q-ratio BCMSV based error bounds are tighter than the block restricted isotropic constant based bounds.