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Tight Measurement Bounds for Exact Recovery of Structured Sparse Signals

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Standard compressive sensing results state that to exactly recover an s sparse signal in R^p, one requires O(s. log(p)) measurements. While this bound is extremely useful in practice, often real world signals are not only sparse, but also exhibit structure in the sparsity pattern. We focus on group-structured patterns in this paper. Under this model, groups of signal coefficients are active (or inactive) together. The groups are predefined, but the particular set of groups that are active (i.e., in the signal support) must be learned from measurements. We show that exploiting knowledge of groups can further reduce the number of measurements required for exact signal recovery, and derive universal bounds for the number of measurements needed. The bound is universal in the sense that it only depends on the number of groups under consideration, and not the particulars of the groups (e.g., compositions, sizes, extents, overlaps, etc.). Experiments show that our result holds for a variety of overlapping group configurations.

Comments:	Refined previous bound and added new experiments
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