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Title: Compressed Sensing and Simple Denoising

Abstract:  
In compressed sensing, we try to recover a sparse $N$-vector from $n < N$ noiseless random measurements. In simple denoising, we try to recover a sparse $N$-vector from $N$ noisy measurements. Although in each problem the estimand is the same, and has the same sparsity properties, the problems are different, in one problem the measurements are noiseless but seriously underdetermined and in the other they are noisy but direct.

The two problems are connected deeply, in the sense that several seemingly really challenging theoretical calculations of a fundamental nature in the compressed sensing problem can be obtained by solving some rather simple and natural minimax estimation problems in the denoising setting.

I’ll give numerous examples of such calculations, contrast the results available via combinatorial geometry and harmonic analysis techniques, and describe some of the interesting recent work, for example on low rank matrix recovery.

Various parts are joint work with Iain Johnstone, Matan Gavish, Arian Maleki, Andrea Montanari, and Galen Reeves.