Computer Science > Information Theory

Weighted algorithms for compressed sensing and matrix completion

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This paper is about iteratively reweighted basis-pursuit algorithms for compressed sensing and matrix completion problems. In a first part, we give a theoretical explanation of the fact that reweighted basis pursuit can improve a lot upon basis pursuit for exact recovery in compressed sensing. We exhibit a condition that links the accuracy of the weights to the RIP and incoherency constants, which ensures exact recovery. In a second part, we introduce a new algorithm for matrix completion, based on the idea of iterative reweighting. Since a weighted nuclear "norm" is typically non-convex, it cannot be used easily as an objective function. So, we define a new estimator based on a fixed-point equation. We give empirical evidences of the fact that this new algorithm leads to strong improvements over nuclear norm minimization on simulated and real matrix completion problems.

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