On the optimality of Orthogonal Greedy Algorithm for dictionaries with small coherence.
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The rate of convergence of Orthogonal Greedy Algorithm / Orthogonal Matching Pursuit (OGA/OMP) for dictionaries with small coherence is studied. We show that OGA provides almost optimal approximation on the first \(\lceil \mu^{-1}/20 \rceil\) steps for \(\mu\)-coherent dictionaries. We also discuss the application of this result in Compressed Sensing. If a matrix \(\Phi\) satisfies the RIP of order \(CK^{1.2}\) with isometry constant \(\delta = cK^{-0.2}\) and has coherence less than \(1/(20K^{0.8})\), then OMP will recover \(K\)-sparse signal \(x\) from \(y = \Phi x\) in at most \(\lceil CK^{1.2}\rceil\) iterations. Therefore \(K\)-sparse signal can be recovered via OMP by \(M = O(K^{1.6} \log N)\) measurements.