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Fixed-Point Continuation Method for ℓ_1 -Regularized Minimization with Application to Compressed
Sensing.*

We consider solving minimization problems with ℓ_1 -regularization:

$$\min \|x\|_1 + \mu f(x),$$

particularly for $f(x) = \frac{1}{2}\|Ax - b\|_M^2$ where $A \in \mathbb{R}^{m \times n}$. Our goal is to construct efficient and robust algorithms for solving large-scale problems with dense data, and our approach is based on two powerful algorithmic ideas, operator-splitting and continuation. A main theoretical contribution of the paper is the establishment of q -linear rate of convergence for our algorithm applied to objectives with convex, but not necessarily strictly convex, f . We present numerical results on solving compressed sensing problems of various types, showing that on large-scale problems the performance of our algorithm compares favorably with that of several recently proposed algorithms. We also briefly discuss some extensions of our approach. (Received June 05, 2007)