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First-order methods for constrained linear inverse problems

Many algorithms have recently been proposed to solve the unconstrained forms of linear inverse problems, but few algorithms solve the constrained form. We show a general framework for solving constrained problems that applies to all problems of interest to compressed sensing. The technique is based on smoothing and solving the dual formulation. Using this method, it is possible to solve problems such as the Dantzig Selector, or composite problems such as minimizing a combination of the TV norm and weighted ℓ_1 norm. Additionally, we discuss recent results about exact regularization and about accelerated continuation. http://arxiv.org/abs/1009.2065