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First-order Methods for Constrained Nonsmooth Optimization

We propose a novel augmented Lagrangian (AL) method for a class of constrained nonsmooth optimization problems. Also, we propose two nonmonotone gradient methods for solving the AL subproblems. Global and local convergence of the methods are established. Finally, we discuss the application of this method to a new formulation of sparse principal component analysis and present some computational results which substantially outperform the other existing approaches.