AHAD DEHGHANI, GERAD

A Primal-Dual Regularized Interior-Point Method for Semidefinite Programming

Interior-point methods in semidefinite programming (SDP) require the solution of a sequence of linear systems which are used to derive the search directions. Safeguards are typically required in order to handle rank-deficient Jacobians and free variables. We generalize the primal-dual regularization of Friedlander and Orban to SDP and show that it is possible to recover an optimal solution of the original primal-dual pair by taking one step of Newton method to a sequence of regularized SDPs at each iteration for both the NT and dual HKM directions. Computationally, a sparse LDL^T factorization may be used on a sparse augmented system instead of the more costly symmetric indefinite factorization. Benefits of our approach include increased robustness and a simpler implementation. Our method does not require the constraints to be linearly independent and does not assume that Slater's condition holds. We report numerical experience on standard problems that illustrate our findings.