Proximal stabilized Interior Point Methods for large scale quadratic programming and *low-frequency-updates* preconditioning techniques

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Abstract

Computational evidence suggests that the Primal-Dual Regularization for Interior Point Methods (IPMs) is a successful technique able to stabilize and to speed-up the linear algebra used in IPM implementations [1]. On the other hand, many issues remain open when IPMs are used in their primal-dual regularized form and, in particular, to the best of our knowledge, the known convergence theory requires strong assumptions on the uniform boundedness of the Newton directions [2]. Recently, the study of the interaction of primal-dual regularized IPMs with the Augmented Lagrangian Method and the Proximal Point Algorithm has permitted to prove the convergence when the regularization parameter is driven to zero at a suitable speed [3].

In this talk, we will show that it is possible to naturally frame the primal-dual regularized IPMs in the context of the Proximal Point Algorithm [4]. Among the benefits of the proposed approach, we will show how convergence can be guaranteed without any supplementary assumptions and how the rate of convergence can be explicitly estimated in relation to (fixed) regularization parameters. Moreover, we will show how regularization could be exploited in order to devise suitable preconditioners of the Newton system which are required to be re-computed just a fraction of the total IPM iterations.

Keywords: Interior point methods, Proximal point methods, Regularized primal-dual methods, Convex quadratic program- ming

References

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