First-Order Methods in Large-Scale Semidefinite Optimization

By Michael Bürgisser

Cuvillier Verlag Jun 2012, 2012. Taschenbuch. Book Condition: Neu. 211x149x5 mm. Neuware - Semidefinite Optimization has attracted the attention of many researchers over the last twenty years. It has nowadays a huge variety of applications in such different fields as Control, Structural Design, Statistics, or in the relaxation of hard combinatorial problems. In this thesis, we focus on the practical tractability of large-scale semidefinite optimization problems. From a theoretical point of view, these problems can be solved by polynomial-time Interior-Point methods approximately. The complexity estimate of Interior-Point methods grows logarithmically in the inverse of the solution accuracy, but with the order 3.5 in both the matrix size and the number of constraints. The later property prohibits the resolution of large-scale problems in practice. In this thesis, we present new approaches based on advanced First-Order methods such as Smoothing Techniques and Mirror-Prox algorithms for solving structured large-scale semidefinite optimization problems up to a moderate accuracy. These methods require a very specific problem format. However, generic semidefinite optimization problems do not comply with these requirements. In a preliminary step, we recast slightly structured semidefinite optimization problems in an alternative form to which these methods are applicable, namely as matrix saddle-point problems. The...

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