An Augmented Lagrangian Algorithm for Solving Semidefinite Programs

TUE/AE01
11:30–11:50

Veronica Piccialli (Univ. Roma Tor Vergata), *Franz Rendl* (Univ. Klagenfurt), *Angelika Wiegele** (Univ. Klagenfurt)

We present an algorithm for solving large-scale semidefinite programs. In this algorithm we replace the positive-definiteness constraint on the dual matrix variable by a factorization since $Z \succeq 0$ implies that there is a matrix V such that $Z = VV^t$. The resulting non-convex minimization problem is then solved using an augmented Lagrangian algorithm.

We present computational results, in particular we solve a semidefinite relaxation of the max-cut problem. This relaxation is formulated in terms of the edges of the graph, thereby exploiting the (potential) sparsity of the problem. Contrary to the basic semidefinite relaxation, which is based on the nodes of the graph, the present formulation leads to a model which yields tighter bounds but is significantly more difficult to solve.

The computational results show that the newly developed algorithm can solve this model for sparse graphs on a few hundred nodes and that the relaxation yields very tight bounds.