

Solving Semidefinite Programs using Bundle Methods and the Augmented Lagrangian Approach

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Several NP-hard combinatorial optimization problems can be approximated by Semidefinite Programs (SDP). Typically, these SDP can be strengthened by combinatorial cutting planes, leading to large-scale SDP, that are unsolvable by standard interior-point methods.

We present several approaches to approximate these SDP. We proceed by dualizing some of the constraints and then work on the Lagrangian dual using various versions of the Bundle method (including the spectral bundle method).

We provide computational experience with this approach applied to Max-Cut and Quadratic Assignment Problems.

Finally, we propose an augmented Lagrangian approach to solve SDP. This approach is again well suited for large scale problems. We present some preliminary experience with this approach applied to relaxations of Max-Clique.