Unifying semidefinite and set-copositive relaxations of binary problems and randomization techniques

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Abstract

A reformulation of quadratically constrained binary programs as duals of set-copositive linear optimization problems is derived using either $\{0,1\}$-formulations or $\{-1,1\}$-formulations. The latter representation allows an extension of the randomization technique by Goemans and Williamson. An application to the max-clique problem shows that the max-clique problem is equivalent to a linear program over the max-cut polytope with one additional linear constraint. This transformation allows the solution of a semidefinite relaxation of the max-clique problem with about the same computational effort as the semidefinite relaxation of the max-cut problem – independent of the number of edges in the underlying graph. A numerical comparison of this approach to the standard Lovasz number concludes the talk.