

Tackling discrete optimization problems by continuous methods

Mirjam Dür

Augsburg University

mirjam.duer@math.uni-augsburg.de

Many NP-hard discrete and combinatorial optimization problems can be formulated with the help of quadratic expressions. These in turn can be linearized by lifting the problem from n -dimensional space to the space of n by n matrices. We show that this leads to a conic optimization problem, i.e., an optimization problem in matrix variables where a constraint requires the matrix to be in the cone of so called copositive or completely positive matrices. The complexity of the original problem is entirely shifted into the cone constraint. We discuss the pros and cons of this approach, and we review the state of the art in this area, covering both theory and numerical solution approaches.