Abstract

"Dantzig-Wolfe decompositions for the cardinality constrained quadratic knapsack problem"

The cardinality constrained quadratic knapsack problem (kQKP) is a variant of the binary knapsack problem in which the objective function is enriched by a quadratic term, and an additional constraint is imposed on the number of items to be selected. The kQKP is well studied in the literature, being at the same time very simple in structure and very challenging from a computational point of view. In this talk I exploit its generality for exploring different ways of combining objective function convexification and problem decomposition, providing different possible relaxation methods. I show that one of these relaxations, relying on Dantzig-Wolfe decomposition, convexification and column generation, yields an optimal integer solution in all instances of a very large set from the literature, and requires competitive computing time. I therefore provide both intuitions and experimental observations for such an extreme phenomenon.