

EDITORIAL

This special issue of *RAIRO-OR* contains selected papers presented at JPOC2 (Journées Polyèdres et Optimisation Combinatoire), the second polyhedral and combinatorial optimization days, held in Marseille during June 2-3, 2005. About 70 participants attended the workshop and more than 20 talks were presented. Held first in Clermont-Ferrand in 2003, this series of meetings aims to promote polyhedral techniques and their applications in combinatorial optimization. It constitutes a forum for senior and younger researchers of the field and related topics. It brings them together to discuss research subjects and initiate possible collaborations.

In the past years, combinatorial optimization has undergone rapid developments, major advances being seen in computational complexity, approximation algorithms and cutting-plane based algorithms. Polyhedral techniques constitute a powerful tool and even the driving force of combinatorial optimization. These techniques consist of associating a binary vector with each solution of the combinatorial optimization problem and optimizing over the convex hull of these vectors. Initiated by the work of Jack Edmonds in the 1960s on the matching problem, these techniques have shown to be very efficient for formulating, analysing and solving hard combinatorial problems. Moreover, as accelerated computer evolution makes large-scale computation practical, they are now playing a fundamental role in approaching real-world problems. The branch-and-cut method is now widely used for obtaining optimal or near optimal solutions for combinatorial optimization problems. Moreover, polyhedral techniques permit to obtain min-max relations and devise efficient approximation algorithms. Some geometric issues of the polytopes associated with the solutions of combinatorial problem, can also be derived using these techniques. The papers selected in this special issue consider almost all these aspects.

– A branch-and-cut algorithm for a resource-constrained scheduling problem by R. Sirdey and H. L. M. Kerivin.

In this paper, the authors propose a powerful branch-and-cut algorithm for the process move programming problem, a scheduling problem that arises in the design of distributed switching systems. The authors also present extensive computational results that demonstrate the efficiency of their algorithm for solving big size instances.

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– On the minimum cost multiple-source unsplittable flow problem by M. Belaidouni and W. Ben-Ameur.

The authors study the minimum cost multiple source unsplittable flow problem. They propose two cutting plane algorithms for the problem based on superadditive cuts. The second one uses special nondecreasing superadditive step functions. These may be generated

in an easier and faster way, which yields a more efficient solution method for the problem. They also give a semi-metric necessary condition for the problem to have a solution.

– Clique partitioning of interval graphs with polymatroidal costs on the cliques by D. Gijswijt, V. Jost, M. Queyranne.

In connection with the coloring problem, the authors study the problem which consists, given weights associated with the cliques of a graph, of determining a minimum-weight partition of the graph into cliques. They provide a polynomial-time algorithm for this problem in the case where the graph is an interval graph and the weight function belongs to a subclass of polymatroid set functions. They also give an integer programming formulation for the problem, discuss TDI-ness of systems related to special graphs and describe min-max relations.

– A note on the Chvatal-rank of clique family inequalities by A. Pecher et A. Wagler.

This paper discusses the Chvatal-rank of the so-called clique family inequalities. These are valid for the stable set problem and play a central role in the description of the stable set polytope in quasi-line graphs.

– On co-bicliques by D. Cornaz.

This paper deals with the co-bicliques of a simple graph (a co-biclique is the edge-set of two disjoint cliques). The author considers the independence system given by the co-bicliques. He gives an integer programming formulation for the maximum co-biclique problem, which involves an exponential number of constraints related to the dependent sets of the system. He characterizes the minimal dependent sets and shows that the linear relaxation of that formulation can be solved in polynomial time.

– Approximation algorithms for metric tree cover and generalized tour and tree covers by V. H. Nguyen.

This article presents approximation algorithms for optimization problems related to tree and tour covers, that is trees and tours whose vertex set forms a vertex cover of the initial graph. Using an integer programming formulation for the tour cover problem, the author describes, in the metric case, a factor 2 approximation algorithm for this problem, improving the best factor 3 established in the literature. The author also provides a factor 3 approximation algorithm for generalizations of the tree and tour cover problems.

– The polytope of m -subspaces of a finite affine space by J. Christophe and J. P. Doignon.

This paper deals with the polytope the extreme points of which are the m -subspaces of a finite affine space (of dimension n . Here m is a given integer $\leq n$).

The authors describe several classes of facet-defining inequalities of this polytope, characterize its group of automorphisms along with the adjacency of its vertices.

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