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Preface

This special issue of *RAIRO-OR* is dedicated to the second International Symposium on Combinatorial Optimization (ISCO 2012), held in Athens, University of Economics and Business (AUEB) on April 19-21, 2012. ISCO 2012 was preceded by the Spring School on "Mathematical Programming and Design of Approximation Algorithms" given by David Shmoys and David Williamson. ISCO is a new biennial conference on combinatorial optimization with its first venue held in Hammamet, Tunisia in March 2010. It brought together researchers from all the communities related to combinatorial optimization, including algorithms and complexity, mathematical programming, game theory, graph theory, and operations research. It is intended to be a forum for the exchange of recent scientific developments and for the discussion of new trends. The scope of the conference includes all aspects of combinatorial optimization ranging from mathematical foundations and theory of algorithms to computational studies and practical applications. Detailed information about ISCO 2012 is available in http://isco12.cs.aueb.gr/.

In the past years, combinatorial optimization has undergone rapid developments, major advances being obtained in different areas. Various exact, heuristic and metaheuristic approaches have been devised for analysing and solving hard combinatorial optimization problems such as cutting-plane methods, Lagrangean relaxation and integer programming techniques. The six papers selected for this special issue consider these aspects.

– A polyhedral study of a two level facility location model by M. Baïou and F. Barahona.

In this paper the authors study a facility location model with two levels. Customers are served by facilities of level one, and each level one facility that is opened must be assigned to an opened facility of level two. They identify a polynomially solvable case, and study some valid inequalities and facets of the associated polytope.

– A branch-and-cut for the non-disjoint m-ring-star problem by P. Fouilhoux and A. Questel.

Here the authors study a network design problem with connectivity requirements. They propose an integer programming formulation for the problem and

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describe classes of facet defining inequalities. Using this, they develop a Branch-and-Cut algorithm which is tested on both random and real instances.

– A distributed transportation simplex applied to a content distribution network problem by R.C. Coutinho, L.M.A. Drummond, and Y. Frota.

The authors consider the classical Transportation Problem and propose a distributed algorithm to solve it. This is composed of two independent phases: first, a distributed heuristic finds a good initial solution; second, it is optimized by a distributed transportation simplex algorithm. The algorithm is compared with the sequential version of the transportation simplex and with an auction based distributed algorithm.

– Integer programming approaches for minimum stabbing problems by B. Piva, C.C. de Souza, Y. Frota, and L. Simonetti.

This paper presents integer programming formulations for some stabbing problems which are solved to optimality through branch-and-bound and branch-and-cut algorithms. Moreover, these models are the basis for the development of Lagrangian heuristics. Computational results are also discussed.

– A branch and bound algorithm for the two-machine flowshop problem with unit-time operations and time delays by A. Moukrim, Djamal Rebaine and Mehdi Serairi.

The authors consider the problem of scheduling, on a two-machine flowshop, a set of unit-time operations subject to time delays with respect to the makespan. They propose an algorithm based on a branch and bound enumeration scheme. A computer simulation to measure the performance of the algorithm is provided for a wide range of test problems.

– Solving multi-agent scheduling problems on parallel machines with a global objective function by F. Sadi, A. Soukhal, and J.-C. Billaut.

Here a scheduling problem on parallel machines is considered. Two cases are discussed, with and without preemption. If preemption is allowed, the authors propose a polynomial time algorithm based on a network flow approach. If preemption is not allowed, they show some general complexity results and develop dynamic programming algorithms.

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