

Advances in Discrete Optimization

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We are presenting in this special issue selected, peer-reviewed, papers that were presented at the 1st International Symposium and 10th Balkan Conference on Operational Research (BALCOR 2011), which was held during September 22-24, 2011, in Thessaloniki, Greece.

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1. Introduction

We are honored to introduce this special issue entitled “Advances in Discrete Optimization” of *Optimization*, which contains selected, refereed articles from the 1st International Symposium and 10th Balkan Conference on Operational Research (BALCOR 2011). This conference is an established biennial event attended by a large number of Operational Research (OR) scientists, instructors, students, not only from the Balkan countries but usually from all over Europe. The general aim of the conference is to facilitate the exchange of scientific and technical information related to OR and to promote international co-operation especially among the Balkan countries. The conference was co-organized by the Branch of Macedonia-Thrace of the Hellenic Operational Research Society (HELORS) and the University of Macedonia. The proceedings of BALCOR 2011 were published in a book of the series *Springer Proceedings in Mathematics & Statistics* (PROMS) [3].

In order to promote the conference and to attract people not only from Europe, but also from all over the world, it was decided to extend it with the 1st International Symposium on Operational Research in Thessaloniki. According to the number of different countries of the participants, we believe that this goal was achieved. BALCOR 2011 was attended by participants from around 20 different countries, both from the Balkans, and also from Russia, France, Brazil, China, Israel, Algeria, Iran, etc. The participants of BALCOR 2011 may read a conference report, prepared by Sifaleras & Davidović in [1] (pp. 329–331). The BALCOR 2011 conference was chaired by Prof. Athanasios Migdalas (Aristotle University of Thessalonica, Greece).

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It is with sorrow that we note that, during the preparation of this special issue, the second guest editor Prof. Konstantinos Paparrizos, suddenly and unexpectedly passed away. Prof. Konstantinos Paparrizos was a well respected and loved colleague for the Operations Research community, at the international level, for his excellent scientific activity and sincerity. He had published several papers in leading international peer-reviewed journals on exterior-point Simplex-type algorithms for linear and network optimization problems, e.g., [2, 4, 5]. Furthermore, he had successfully stimulated many young scientists. Therefore, this special issue is dedicated to his memory.

The following Section 2 presents the aim of this special issue, whilst a short description of the manuscripts that were selected for inclusion in this special issue is given in Section 3.

2. Aim of the special issue

Our call of this special issue invited submissions on theoretical, methodological, or applied aspects of discrete optimization problems. The call-for-papers addressed the recently growing research interest in discrete optimization problems. The objective of this special issue of *Optimization* was to present recent advances in areas of discrete optimization, such as network optimization, integer programming, discrete optimization models in economics or engineering, etc.

Each submission to this special issue was peer reviewed by at least two referees. After a reviewing process, nine papers were finally accepted for publication in this issue among 15 papers submitted. These papers investigate scheduling, timetabling, matching, and other nontrivial optimization problems arising in various areas such as railways, electricity markets, taxation systems, etc.

3. Special issue's articles

The issue begins with the paper “Finding a minimum-regret many-to-many Stable Matching” by Eirinakis P., Magos D., Mourtos I., and Miliotis P. The authors propose a time-optimal algorithm for solving the minimum-regret problem for the many-to-many stable matching problem. The paper presents an $O(n^2)$ algorithm for finding a minimum-regret solution.

Bruno E., Paschos V. Th., and Tourniaire E., in their paper “Moderately exponential time and fixed parameter approximation algorithms”, survey approximation issues matching ideas and tools from the fields of polynomial approximation, moderately exponential computation and fixed parameter tractability.

The paper by Čangalović M., Kratica J., Kovačević-Vujčić V., and Stojanović M. entitled “Minimal doubly resolving sets of prism graphs”, theoretically determines the minimal cardinality $\psi(Y_n)$ of doubly resolving sets for the prism graphs Y_n . The authors prove that the minimal cardinality is equal to four if n is even and equal to three if n is odd, where n is the number of nodes.

The article by Kozanidis G., Kostarelou E., Andrianesis P., and Liberopoulos G. entitled “Mixed integer parametric bilevel programming for optimal strategic bidding of energy producers in day-ahead electricity markets with indivisibilities”, addresses the problem of finding the optimal bidding strategy of an energy producer that participates in a single-period day-ahead electricity market, assuming full knowledge of the markets parameters. The authors formulate the problem as a mixed integer bilevel optimization model and present an efficient algorithm based on integer parametric programming.

Makajić-Nikolić D., Vujošević M., and Nikolić N. propose a new algorithm for minimal cut sets generation of a coherent fault tree without repeated events, in their work “Minimal cut sets of a coherent fault tree generation using reverse Petri nets”. Their approach is based on reverse Petri nets which can be generated directly from the fault tree.

In the study of Gkortsilas D. and Zaroliagis Ch., “An experimental study of bicriteria models for robust timetabling”, an experimental study is conducted for the timetabling problem in a public railway network under disruptions. The authors investigate three recent bicriteria optimization problems that model the robustness of a timetable towards delays using real-world data from the German Railways.

Davidović T., Jakšić T., Ramljak D., Šelmić M., and Teodorović D., in their paper “Parallelization strategies for bee colony optimization based on message passing communication protocol”, present new and efficient distributed memory parallelization strategies for the bee colony optimization meta-heuristic method.

The paper by Glavelis Th. and Samaras N., “An experimental investigation of a primal-dual exterior point simplex algorithm”, demonstrate the practical behavior of the primal-dual exterior point Simplex algorithm for linear programming problems. The authors present a comparative computational study between the former algorithm and also the revised primal Simplex algorithm and the primal exterior point Simplex algorithm.

The issue closes with the paper by Goumagias N. and Hristu-Varsakelis D. entitled “Tax evasion by risk-averse firms in Greece: a discrete Markov-based optimization model”. The authors present a discrete Markov-based optimization model which can be used to simulate the decision-making process of a typical risk-averse Greek firm, under various tax penalty and audit probability combinations, for different levels of risk aversion.

Acknowledgments

We would like to thank all the authors for their interest in our special issue and their excellent contributions. We also thank all the referees who worked hard to review all the submitted papers and provided excellent reports. The support provided by LINDO Systems, Inc., Banxia Software Ltd., Marathon Data Systems, and the University of Macedonia, has significantly contributed to the success of the conference.

The preparation of this special issue begun in 2011 and completed in 2013. Therefore, we wish to acknowledge not only Professor Christiane Tammer and Dr. Andreas Löhne, who currently serve as Editor-in-Chief and Managing Editor respectively of *Optimization* for their valuable support and assistance, but also Professor Juan Enrique Martinez-Legaz and Dr. Rosalind Elster, who were the former Editor-in-Chief and former Managing Editor respectively of *Optimization* until 2012.

To conclude we would like to welcome Prof. Nenad Mladenović who will be the conference chair of the forthcoming BALCOR 2013, which will be held during September 7-10, 2013, in Belgrade-Zlatibor, Serbia.

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