Preface

This volume contains a selection of papers that were presented at the Modeling and Optimization: Theory and Applications (MOPTA) Conference held at Lehigh University in Bethlehem, Pennsylvania, USA, between July 30 and August 1, 2012. MOPTA 2012 aimed to bring together a diverse group of researchers and practitioners, working on both theoretical and practical aspects of continuous or discrete optimization. The goal was to host presentations on the exciting developments in different areas of optimization and at the same time provide a setting for close interaction among the participants. The topics covered at MOPTA 2012 varied from algorithms for solving convex, combinatorial, nonlinear, and global optimization problems and addressed the application of optimization techniques in finance, electricity systems, healthcare, and other important fields. The five papers contained in this volume represent a sample of these topics and applications and illustrate the broad diversity of ideas discussed at the conference. Below, we briefly introduce each of them.

The paper by Anjos provides a comprehensive review of the mathematical optimization models that have been proposed to address the Unit Commitment problem. This is a fundamental problem in the operation of power systems that seeks to find the optimal way to generate a power production schedule, while ensuring demand satisfaction and the safe and reliable operation of the system. The Unit Commitment problem is becoming increasingly important and challenging. This is mainly due to the transition to low-carbon, sustainable, and renewable energy sources (e.g., wind and solar energy) and the need to reliably satisfy increasing energy demands in a scarce resource, highly competitive, and interconnected economy.

The paper by Lejeune considers a novel way to take into account uncertainty in the key problem of optimal portfolio allocation. Furthermore, the paper provides algorithmic techniques to address the solution of large-scale problems in this class with practically relevant features that make their solution more challenging. Namely, he considers the portfolio allocation problems with features such as fixed transaction costs and diversification, cardinality, and buy-in threshold constraints. Large-scale

problems in this category become difficult to solve by commercially available optimization solvers. Thus, the focus is to obtain optimal or close to optimal solutions to the problem in a fast manner.

The paper by Regis considers black-box optimization problems for which the dependance between the objective function and the decision variables is not available in explicit functional form. Instead, values of the problems' objective can only be computed for given values of the decision variables through computationally expensive simulations. For this class of problems, the paper proposes an initialization strategy that can be effectively used to substantially improve the performance of solution algorithms for black-box optimization problems. This is shown by presenting corresponding computational results on problems with up to one thousand variables. In particular, instances of a black-box optimization problem arising in the management of groundwater bioremediation are considered.

The paper by Benson and Sağlam considers the solution of mixed-integer second-order cone optimization (MISOCO) problems using a combination of nonlinear, branch-and-bound, and outer approximation techniques. A key of their approach is that it allows for warmstarting when solving the continuous relaxation of the problem. The performance of their proposed techniques is investigated on MISOCO problems arising in portfolio allocation problems. Currently, MISOCO problems appear in many engineering, healthcare, and finance applications, as well as in the general context of robust optimization. Thus, this paper contributes to the development of specific algorithmic techniques for this very important class of problems.

The paper by Li and Terlaky investigates the duality relationship between two keystone algorithms to solve linear feasibility problems, namely, the perceptron and the von Neumann algorithms. This approach allows to interpret variants of the perceptron algorithm as variants of the von Neumann algorithm and vice versa and transit the complexity results from one family to the other. Advances related to this class of inexpensive algorithms are key, given the growing need to solve extremely large optimization problems in most current practical applications.

These papers address the two focus areas of the MOPTA Conference, namely, the role that modeling plays in the solution of an optimization problem and advances in optimization algorithms, theory, and applications.

We end this preface by thanking the sponsors of MOPTA 2012, namely, AIMMS (http://business.aimms.com/) , GuRoBi Optimization (http://www.gurobi.com/), IBM (http://www.research.ibm.com/), Mosek (http://www.mosek.com/), and SAS (http://www.sas.com/). We also thank the host, Lehigh University, as well as the rest of the organizing committee: Frank E. Curtis, Eugene Perevalov, Ted K. Ralphs, Katya Scheinberg, Larry V. Snyder, Robert H. Storer, and Aurélie Thiele.

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http://www.springer.com/978-1-4614-8986-3

Modeling and Optimization: Theory and Applications
Selected Contributions from the MOPTA 2012 Conference
Zuluaga, L.F.; Terlaky, T. (Eds.)
2013, VII, 136 p. 10 illus., Hardcover
ISBN: 978-1-4614-8986-3