J Glob Optim (2014) 60:1–3
DOI 10.1007/s10898-014-0216-9

EDITORIAL

Preface of the special issue OR: connecting sciences supported by global optimization related to the 25th European conference on operational research (EURO XXV 2012)

Adil Bagirov · Kaisa Miettinen · Gerhard-Wilhelm Weber

Received: 16 June 2014 / Accepted: 23 June 2014 / Published online: 28 June 2014

This volume of the *Journal of Global Optimization* is devoted to papers presented at the *25th European Conference on Operational Research, EURO XXV 2012*, which was held on July 8-11, 2012, in Vilnius, Lithuania. The conference attracted 2044 registered participants from 68 countries from all the continents across the OR community. Continuous Optimization was one of the largest main areas in the entire conference with about 250 participants. They exchanged experiences in solving real-world problems, discussed recent achievements in optimization theory, methods and applications, reported on developments and implementations of appropriate models and efficient solution procedures for problems of continuous optimization. The *EURO XXV 2012* conference provided an excellent forum for researchers and practitioners to promote their recent advances in continuous optimization to the wider scientific community, to identify new research challenges as well as promising research developments in theory, methods and applications and to promote interactions with colleagues from related research areas of modern OR and its emerging applications. In this spirit, this special issue is devoted to the theme c*onnecting sciences supported by global optimization*.

For this special issue, participants of *EURO XXV 2012* were invited to submit papers on continuous optimization and related topics. The papers included recent theoretical and applied contributions in various fields including linear, nonlinear, stochastic, parametric and dynamic optimization as well as control theory. Based on rigorous reviewing processes, six papers

A. Bagirov (✉)
School of Science, Information Technology and Engineering, Federation University Australia, University Drive, Mount Helen, P.O. Box 663, Ballarat, VIC 3353, Australia
e-mail: a.bagirov@ballarat.edu.au; a.bagirov@federation.edu.au

K. Miettinen
Department of Mathematical Information Technology, University of Jyvaskyla, P.O. Box 35 (Agora), 40014 Jyvaskyla, Finland
e-mail: kaisa.miettinen@jyu.fi

G.-W. Weber
Institute of Applied Mathematics, Middle East Technical University, 06531 Ankara, Turkey
e-mail: gweber@metu.edu.tr

were accepted for publication and included in this special issue. Their short descriptions follow.

Hoai An Le Thi and *Duc Quynh Tran* consider a multi-period problem of fair transfer prices and inventory holding policies in two enterprise supply chains. The problem is formulated as a mixed integer nonlinear optimization problem. The problem is first reformulated as a difference of a convex optimization problem via an exact penalty technique. Then, the DCA algorithm, an efficient local algorithm in the nonconvex optimization framework, is studied to solve the difference of a convex problem. For solving this problem globally, the authors investigate a combined DCA-Branch and Bound algorithm. DCA is applied to get lower bounds while upper bounds are computed from a relaxation problem. The numerical results on several test problems demonstrate that these algorithms are efficient for solving the problem under consideration.

In the paper by *Takayuki Okuno* and *Masao Fukushima*, a semi-infinite problem with infinitely many second-order cone constraints, called SISOCP for short, is considered. Compared with the standard semi-infinite and the second-order cone problems, studies on SISOCP are scarce. The authors develop an algorithm that combines a local reduction method with an SQP-type method where SISOCP is reduced to a second-order cone problem with finitely many second-order cone constraints by means of implicit functions. They study the global and local convergence properties of the proposed algorithm and demonstrate its effectiveness through numerical experiments.

Vinicius L. Xavier, Felipe M.G. Franca, Adilson E. Xavier and *Priscila M. V. Lima* investigate the multisource Weber problem, also known as the Fermat–Weber problem. A particular case of this problem is the minimum sum-of-distances clustering problem, also known as the continuous p-median problem. It is formulated as a min-sum-min problem, which is a nonsmooth optimization problem. Moreover, this problem has a large number of local minimizers and, thus, it is a global optimization problem. An approach based on the so-called hyperbolic smoothing methodology is developed to solve the problem. The final solution is obtained by solving a sequence of continuously differentiable unconstrained optimization subproblems, which gradually approaches the original problem. Results of numerical experiments are presented to demonstrate both the reliability and the efficiency of the method.

In the paper by *Wen Li* and *Song Wang*, a numerical technique based on a finite difference scheme in space and an implicit time-stepping scheme for solving the Hamilton-Jacobi-Bellman equation arising from the penalty formulation of the valuation of European options with proportional transaction costs is proposed. The authors prove that the approximate solution from the numerical scheme converges to the viscosity solution of the Hamilton–Jacobi–Bellman equation as the mesh sizes in space and time approach zero. An iterative scheme for solving the nonlinear algebraic system arising from the discretization is proposed and its convergence is established. Numerical experiments are presented to demonstrate the robustness and the accuracy of the method.

A new modification of the multivariate adaptive regression splines (MARS) algorithm is introduced in the paper by *Elcin Kartal Koc* and *Cem Iyigun*. In a conventional adaptive spline procedure, knots are selected from a set of all distinct data points that makes the forward selection procedure computationally expensive and leads to a high local variance. To avoid this drawback, it is possible to restrict the knot points to a subset of data points. In this context, a new method is proposed for knot selection, which bases on a mapping approach like self-organizing maps. The proposed algorithm is applied to artificial and real datasets. Numerical results show that this algorithm proposes a time efficient forward step for the knot selection and model estimation without degrading the model accuracy and the prediction performance.

Elcin Kartal Koc, Cem Iyigun, İnci Batmaz and *Gerhard-Wilhelm Weber* develop two new versions of MARS algorithm. MARS was modified by proposing an alternative backward stepwise algorithm through Conic-MARS (CMARS) which uses a penalized residual sum of squares for MARS as a Tikhonov regularization problem and by introducing the forward step of MARS via a mapping approach (S-FMARS). In this paper, two hybrid methods are proposed based on CMARS and S-FMARS to produce time efficient data mining tools without degrading their performances especially for large datasets. The resulting algorithms, called SMARS and SCMARS, are tested in terms of accuracy, complexity, stability and robustness using artificial and real datasets. These algorithms are also applied to predict interest rates offered by a Turkish bank to its customers.

Acknowledgments We as guest editors want to warmly thank all authors who showed interest in this special issue and all the reviewers who accepted the invitation to provide their expertise and gave constructive comments. Thanks to the Editor-in-Chief of the *Journal of Global Optimization*, *Professor Sergiy Butenko*, for his confidence, interest and continuous support. We also extend our cordial thanks to the Past Editor-in-Chief of the *Journal of Global Optimization*, *Professor Panos Pardalos*, who was with us at the very beginning of this special issue project and its approval. We wish all the readers a pleasant and enjoyable, instructive, and inspiring study of the contributions of this special issue.