



Newsletter 15 of EUROPT

EUROPT - The Continuous Optimization Working Group of EURO

<http://www.iam.metu.edu.tr/EUROPT/>

May 2009

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Words from the chair

Dear Members of EUROPT, dear Friends,

The most important events in which EUROPT is involved, our 7th EUROPT Workshop "Advances in Continuous Optimization" (July 3-4, 2009, Remagen, Germany) and the 23rd European Conference on Operational Research (XXIII EURO, July 5 - 8, Bonn, Germany), are becoming closer and closer in time. These events bring us the opportunity to meet each other, to interchange ideas and experiences, and they will also represent the occasion for reflecting about the recent past of EUROPT and proposing new goals.

I suppose that this reflection should take as a starting point the last Activities Reports that you can find in our website (<http://www.iam.metu.edu.tr/EUROPT/>), where the huge amount of activities (workshops, schools, special issues, etc.) in which EUROPT has been involved in its short life is really impressive. I have to confess certain pride feeling and I would like to express, from there, my deep gratitude to all the friends, and successive managers teams, that have contributed to make EUROPT so great as it is now (more than 1000 members!). At present, the main challenge is to maintain our group so active and enthusiastic as it has been since its foundation. Happily, the fact that in the Remagen Workshop we are close to have 70 talks, and that in Bonn there will be 13 streams related to "Continuous Optimization" (see below), constitutes an excellent indicator of the good health of our research topic inside Operations Research, to which EUROPT feels compelled to provide permanent stimulus and support.

I am looking forward to meeting you in Remagen and Bonn, next July.

With my best wishes, Yours sincerely,
Marco A. Lopez, Chair of EUROPT

Streams in the XXIII EURO Conference related with EUROPT:

- 1.- Janos D. Pinter, Eligius Hendrix: *Global Optimization*
- 2.- Gerhard-Wilhelm Weber, Karel Zimmermann, Tamas Terlaky, Imre Polik, Alexander Martin: *Mathematical Programming*
- 3.- E. Alper Yildirim, Tatiana Tchemisova, Olga Kostyukova: *Nonlinear Programming*
- 4.- Jan-J. Rückmann, Oliver Stein, Marco A. López-Cerdá, Miguel Goberna, Maxim Todorov: *Semi-Infinite Optimization*
- 5.- Adil Bagirov, Antonio Fuduli, Refail Kasimbeyli: *Nonsmooth Optimization and its Applications*
- 6.- Vicente Novo, Bienvenido Jimenez , Cesar Gutierrez: *Vector and Set-Valued Optimization*
- 7.- Bülent Karasözen, Ronald W. Hoppe: *PDE Constrained Optimization*
- 8.- Georg J. Still, Jürgen Guddat: *Parametric Optimization*
- 9.- Aharon Ben-Tal, Amir Beck, Marc Teboulle: *Convex Optimization 1*
- 10.- Stephan Dempe, Christian Kanzow: *Variational Inequalities and Bi-Level Problems*
- 11.- Angelia Nedich, Asu Ozdaglar: *Convex Optimization 2*
- 12.- Rainer Tichatschke, Alexander Ioffe, Özlem Birgül, Xiaoqi Yang: *Ill-posed Variational Problems - Theory, Methods and Applications*
- 13.- Pham Dinh Tao , Le Thi Hoai An: *Nonconvex Programming: Local and Global Approaches - Theory, Algorithms and Applications*

Forthcoming Events

- **Summer School AACIMP**

August 5-16, 2009
Kyiv, Ukraine

summerschool.ssa.org.ua

The Summer School is an annual project providing a possibility to know more about promising fields of contemporary science from the leading Ukrainian and European professionals for those who are interested to learn more than standard courses in an institute or in a university can offer! In addition to the educational program, an extensive cultural one is guaranteed to the participants.

Who can apply: The Summer School offers the courses for undergraduate-level university students, graduate school students and the professionals who work in the field of science and engineering.

Courses: *Part A.* Contemporary Mathematics (operations research, logistics, topology, fractals).

Part B. Contemporary Natural Science (physics, chemoinformatics, sustainable development, nanotechnology, neurosimulation, biophysics).

Part C. Urgent problems of IT and Informatics Development.

The participants will be divided into 2 or 3 groups according to the specific interests, and will join the separate sessions that will be conducted simultaneously.

Fee: The fee of 120 per participant includes registration and participants materials, course attendance, and social program. The project is organized and coordinated by the Students' Science Association of National Technical University of Ukraine "KPI". For more information visit the Summer School web-site: <http://summerschool.ssa.org.ua>

Contacts. Student Science Association 37, prospect Peremohy, building 1, room 299(15) 03056, Ukraine, Kyiv

Telephone: +38 044 454 9243

Fax: +38 044 454 9243

E-mail: summerschool@ssa.org.ua

- **CASYS09**

**International Conference on COMPUTING ANTICIPATORY
SYSTEMS**

HEC Management School–University of Liege, LIEGE, Belgium
August 3 - 8, 2009

<http://www2.ulg.ac.be/mathgen/CHAOS/>

Scope of CASYS09 will be oriented to theoretical developments and applications in the modelling and computing of anticipatory systems in any fields of natural and artificial

systems.

Following the definition of Daniel M. Dubois: A computing anticipatory system is a system that computes its current states in taking into account its past and present states but also its potential future states. Daniel M. Dubois introduced the concepts of Strong and Weak Anticipation:

Strong anticipation refers to an anticipation of events built by or embedded in a system.

Weak anticipation refers to an anticipation of events predicted or forecasted from a model of a system.

International Program Committee: Jair Minoro Abe (Brazil), Richard L. Amoroso (USA), Marcel Ausloos (Belgium), Jean-Paul Broonen (Belgium), Jerry Chandler (USA), Jingde Cheng (Japan), Fabio Romeu de Carvalho (Brazil), Daniel M. Dubois (Belgium), Louis Esch (Belgium), George L. Farre (USA), Jean Godart (Belgium), Thierry Grisar (Belgium), Stig C. Holmberg (Sweden), Pere Julià (Spain), Ryszard Klempous (Poland), Eugène Kindler (Czech Republic), Loet Leydesdorff (The Netherlands), Francis Lowenthal (Belgium), Peter J. Marcer (France), Ion I. Mirità (Romania), Nicholas A. Nechval (Latvia), Gilles Nibart (France), Erik Noldus (Belgium), Stefan Pickl (Germany), Jean Ramaekers (Belgium), Salvatore Santoli (Italy), Juan Jesus Torres Carbonell (Spain), Robert Vallée (France), Gertrudis Van de Vijver (Belgium)

International Scientific Committee: Igor Aleksander (UK), Adel F. Antippa (Canada), Ioannis Antoniou (Greece), Viveca Asproth (Sweden), Péter B. Béda (Hungary), Mark Burke (Ireland), George F. Chapline (USA), John Collier (South Africa), John G. Cramer (USA), Daniel M. Dubois (Belgium), Andrée C. Ehresmann (France), Rodolfo Faglia (Italy), Walter Freeman (USA), Yukio-Pegio Gunji (Japan), Anita Hakansson (Sweden), Mikuláš Huba (Slovakia), Eugenia Kalisz (Romania), Louis H. Kauffman (USA), Etienne E. Kerre (Belgium), Dobilas Kirvelis (Lithuania), George J. Klir (USA), Vadim F. Krotov (Russia), Michele Malatesta (Italy), Gianfranco Minati (Italy), Edgar D. Mitchell (USA), Laurent Nottale (France), Eufrosina Otlacan (Romania), Karl Pribram (USA), Otto E. Rössler (Germany), Peter Rowlands (United-Kingdom), Alfonso Rueda (USA), Walter Schempp (Germany), Eric Schwarz (Switzerland), José Luis Simões da Fonseca (Portugal), Pawel Siwak (Poland), Alexander A. Sytnik (Russia), Edwina Taborsky (Canada), Ernst von Glasersfeld (USA), Lotfi A. Zadeh (USA)

Awards for the Best Papers:

The best papers to be awarded, in each CASYS09 symposium, will be selected and based on the draft paper and oral presentation by registered authors. The Best Paper Awards Ceremony will happen on Saturday 8, 2009. Acceptance of the final camera-ready paper will be notified after the review process of the draft full paper, after the conference, for October 1, 2009. Only papers orally presented by registered authors will be considered for publication in the proceedings. Draft papers, received after JUNE 1, 2009, will not be considered for a Best Paper Award

IMPORTANT DAYS

SUBMISSION OF A TITLE OF A PAPER: As soon as possible

SUBMISSION OF A DRAFT PAPER: June 1, 2009

• **INFORMS-DM-SI 2009**
**4th INFORMS Workshop on Data Mining and System
Informatics**
San Diego, USA
October 10, 2009

<http://www.informs-dm.org/annualworkshop.htm>

Workshop Outline: The Data Mining (DM) and Artificial Intelligence (AI) Subdivisions of the Institute for Operations Research and Management Sciences (INFORMS) propose to jointly organize the Fourth Pre-conference Workshop in conjunction with the 2009 INFORMS Annual Conference in San Diego, USA. The last three workshops were well received with more than 20 presentations and 100 attendances. The attendees showed strong interest in future meetings following a similar workshop format.

We propose to organize the 4th INFORMS Workshop on Data Mining and System Informatics as a one-day event on October 10, 2009, prior to the INFORMS Annual Meeting.

The objectives of this workshop are to:

- Present state-of-the-art research and practice of data mining and system informatics applications;
- Encourage research collaboration among DM and AI members;
- Publicize the existence of the DM and AI subdivisions at INFORMS and attract new members within and beyond INFORMS.

Organizing Committee: The proposed workshop Organizing Committee consists of members from the AI and DM subdivisions:

Program Chairs: Yuanshun Dai (DM), Theodore Trafalis (AI)

Management Committee: Kwok Tsui, Tom Au, Tory Chen and George Runger

Review Committee: Yuanshun Dai, Theodore Trafalis

The proposed Workshop will consist of two parallel tracks, a system informatics applications track and a data mining research track. Each track will consist of two morning sessions and two afternoon sessions, and each session will consist of three presentations. A plenary speaker will be scheduled over lunch.

Abstracts: (200 words or less) submitted for the Workshop will be reviewed by two members of the Organizing Committee. Please see the next page for the distributed Call for Papers and timeline. Authors of accepted abstracts will be expected to give a presentation at the Workshop and submit a short paper, not exceeding 6 pages, for a Workshop Proceedings that will be distributed at the Workshop on CD. We are currently in contact with several journals to discuss the possibility of publishing a special issue based on extended version of selected high-quality workshop papers.

Abstract submission: On behalf of the INFORMS-DM-SI 2009 Organizing Committee, we would like to invite you to submit an abstract, not exceeding 200 words, for review. Authors of accepted abstracts will be expected to give a presentation at

the Workshop and submit a short paper, not exceeding 6 pages, for the Workshop Proceedings, to be published on a CD. Submit abstracts and papers electronically at informs.dm.workshop@gmail.com

Contacts: For inquiries, please contact Program co-Chairs Yuanshun Dai at: ydai1@utk.edu, or Theodore Trafalis at: ttrafalis@ou.edu.

IMPORTANT DAYS

Abstract submission (200-word abstracts): June 15, 2009

Acceptance decisions sent out: July 15, 2009

Proceedings papers: September 30, 2009

Workshop: October 10, 2009

• **Second COSI Summer School on Decision Aiding
International Conference of Numerical Analysis and Applied
Mathematics 2009
Annaba, Algeria
23-24 May 2009**

<http://cosi.isima.fr/ecolecosi2009>

Announcement in French: La seconde école d'été sur l'aide à la décision "COSI - Summer school on décision aiding" aura lieu le 23 et 24 mai 2009 à Annaba (juste avant la conférence COSI).

Cette seconde école est soutenue par le programme Inspire de Microsoft Research.

Nous avons donc la possibilité de financer grâce à notre sponsor un nombre limité de jeunes chercheurs (en doctorat, magister) pour participer à cette école. Pour les jeunes chercheurs sélectionnés, leurs frais de séjour seront totalement pris en charge.

Les conditions stipulées dans le contrat de Microsoft, nous obligent à respecter une certaine procédure pour être pris en charge.

Pour ceux qui souhaitent postuler, veuillez vous rendre sur le site de l'école et consulter les rubriques suivantes :

- le programme et les cours de l'école : pour voir si les cours proposés rentrent bien dans vos centres d'intérêts.

- scholarships : pour voir les modalités de candidature. Veuillez fournir les éléments demandés. Nous avons l'obligation de fournir ces éléments à Microsoft Research

Cette école offre la possibilité aux jeunes chercheurs n'ayant pas eu la possibilité cette année de participer à COSI de venir assister à l'école.

N'hésitez pas à diffuser autour de vous cette appel à participation à l'école d'été.

Contacts: Farouk Toumani,
email: ftoumani@isima.fr

WCO'09
2nd Workshop on Computational Optimization
October 12-14, 2009
Mragovo, Poland

in the framework of IMCSIT 2009 - International Multiconference on Computer Science and
Information Technology

<http://www.imcsit.org>

FINAL CALL FOR PAPERS

Scope and aims: Many real world problems arising in engineering, economics, medicine and other domains can be formulated as optimization tasks. These problems are frequently characterized by non-convex, non-differentiable, discontinuous, noisy or dynamic objective functions and constraints which ask for adequate computational methods.

The aim of this workshop is to stimulate the communication between researchers working on different fields of optimization and practitioners who need reliable and efficient computational optimization methods.

We invite original contributions related with both theoretical and practical aspects of optimization methods.

Topics: The list of topics includes, but is not limited to:

unconstrained and constrained optimization; combinatorial optimization; global optimization; multiobjective and multimodal optimization; dynamic and noisy optimization; large scale optimization; parallel and distributed approaches in optimization; random search algorithms, simulated annealing, tabu search and other; derivative free optimization methods; interval methods; nature inspired optimization methods (evolutionary algorithms, ant colony optimization, particle swarm optimization, immune artificial systems etc.); hybrid optimization algorithms involving natural computing techniques and other global and local optimization methods; memetic algorithms; optimization methods for learning processes and data mining; computational optimization methods in statistics, econometrics, finance, physics, medicine, biology, engineering etc.

Submission:

Authors should submit draft papers (as Postscript, PDF or MSWord file) no longer than 8 pages. (IEEE style - available at <http://www.submit.imcsit.org/>)

Papers will be refereed and accepted on the basis of their scientific merit and relevance to the workshop.

Publication: Accepted and Presented paper will be published in the Conference Proceedings and included in the IEEE XploreR database.

Extended versions of the accepted papers will be published in *Mathematica Balkanica* (<http://mathbalkanica.info/board.htm>) after additional reviewing.

Program Committee:

Vasile Berinde, North University of Baia Mare, Romania; Janez Brest, University of Maribor, Slovenia; Biswa Nath Datta, Northern Illinois University, USA; Andries P Engelbrecht, University of Pretoria, South Africa; Stefka Fidanova, Academy of Sciences, Bulgaria Frederic Guinand, University of Le Havre, France; Le Thi Hoai An, Universite Paul Verlaine - Metz, France; Igor Konnov, Kazan University, Russia; Jouni Lampinen, University of Vaasa, Finland; Jose Mario Martinez, State University of Campinas, Brazil; Stefan Maruster, West University of Timisoara, Romania; Kaisa Miettinen, University of Jyvaskyla, Finland; Ferrante Neri, University of Jyvaskyla, Finland; Kalin Penev, Southampton Solent University, UK; Mikhail V. Solodov, Institute of Pure and Applied Mathematics, Rio de Janeiro, Brazil; Stefan Stefanov, Neofit Rilski South-Western University Blagoevgrad, Bulgaria ; Ponnuthurai Nagaratnam Suganthan, School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore; Josef Tvrdik, University of Ostrava, Czech Republik; Daniela Zaharie, West University of Timisoara, Romania

IMPORTANT DAYS

Full paper submission (extended deadline): 24.05.2009

Notification of acceptance: 01.07.2009

Camera-ready version of the accepted paper : 15.08.2009

PCO 2010
Global Conference on Power Control Optimization
Gold Coast, Australia
2-4 February, 2010

<http://www.engedu2.net>

It is our great pleasure to announce the third Global Conference on Power Control and Optimization PCO 2010, which will be held in Marriott hotel, Gold Coast, Australia from 2 to 4 February 2010. The Conference is technically sponsored by IOI Press, AIP, Springerlink TF and professional Engineering publisher and organized by the Technion Israel Institute of Technology and Curtin University of Technology, Malaysia.

Scope of the conference is contemporary and original research and educational development in the area of electrical power engineering, control systems and methods of optimization. The scope of the conference includes, but not limited to, the following topics:

Hybrid renewable energy and energy saving, Power systems, protection and reliability, Controllers, drives and machine design, Smart system and dynamic robust system, Mechatronics and nano physics, NEMS and MEMS, Simulators and software engineering, Soft computing and computational intelligent, Bioinformatics and body sensors, Fuzzy and hybrid optimization, Queuing theory and game theory, MRP, ERP, Inventory project management, Artificial immune systems, Evolutionary algorithms, Ant colony, genetic and swarm optimization, Probabilistic possibilistic optimization, Production design and rough set, Line, pattern searches and decision making, Scheduling and assignment problems, Continuous and combinatorial

operation, Graf theory and supply chain management, Micro transportation, Network communication and wireless sensor, Condition monitoring and instruments

Submission: Prospective authors from universities or institutes and industries are invited to submit the full paper by email before the deadline. Paper should be submitted electronically, formatted in MSWord, as per PCO guideline. All papers will be peer reviewed by independent specialists as per IEEE guide. PCO-10 proceeding will be published online by AIP. Selected papers will be published in Elsevier, Springer, Inderscience, Professional Engineering, and other Journals. Proposal for holding special sessions, tutorial and workshop are invited from prospective authors, industrial bodies and academicians, and should be addressed to the Chair. The program committee is currently looking for speakers and financial sponsors from industry, academics, and professional bodies.

Organizing Committee: Pandian Vasant (Malaysia), Liron Yedidsion (Israel), Rabi W Yousif (Malaysia), Jeffrey Webb (Malaysia)

Steering Committee: Kenneth Adan (Malaysia), Sermsak Uatrongjit (Thailand), Fernando Jimenez (Spain), Youssef Attallah (Lebanon), Dvir Shabtay (Israel), Cevetco Andreeski (Macedonia), Andrew Kusiak (USA), Wei Xu, UK

International Programm Committee: Terry Williams (UK), David A. Pelta (Ireland), Janos Sebstyen (Hungary), Sankar Pal (India), Didier Dubois (France), Xiao-Zhi (Finland), John Mellor (UK), Jeng-Shyang (Taiwan), Praveen Jain (Canada), Frede Blaabjerg (Denmark), Christoph Meyer (Germany), Nicola Femia (Italy), Nikhil Ranjan Pal (Taiwan), Henry Nuttle (USA), Gerhard Wilhelm Weber (Turkey), Fernando Gomide (Brazil), Moti Henig (Israel), Sergey Kryzhevich (Russia), Gianfranco Rizzo (Italy)

Registration: Registration fee covers three day sessions, program booklet, CD proceeding, lunches, tea breaks, and banquet dinner. The fee is unique and identical for all delegates. The registration form must be submitted by email before the deadline to: icpco.20@gmail.com. Each accepted paper must be presented by one of the authors after paying the necessary fee of 300.00 EURO. This fee is applied for all delegates, accompanies and students. No discount or waving will be given.

Contacts: All correspondence should be addressed to the conference secretariat: Tel: 605 3711416, 6085 443821

Email: icpco.20@gmail.com

IMPORTANT DAYS

Submission of Full Papers: October 1, 2009

Notification with Peer Review: November 1, 2009

Camera-ready Paper: December 15, 2009

Registration with Full Payment: December 15, 2009

IFORS 2011
19th Triennial Conference of the International Federation of
Operational Research Societies
10th to the 15th July 2011
Melbourne, Australia

<http://www.ifors2011.org/>

Conference Organising Committee:

Chair: Dr Patrick Tobin, School of Arts and Sciences (Vic), Australian Catholic University, Melbourne Campus (St Patrick's)

e.mail: Patrick.Tobin@acu.edu.au

Phone: +61 3 9953 3199, Fax: +61 3 9495 6141

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Phone: +61 2 4921 6717, Fax: +61 2 4921 6898

Conference Program Committee Chair:

Prof May Yee (Janny) Leung, Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong Office: Room 509, William M.W. Mong Engineering Building Phone: (852) 2609-8238

e.mail: janny@se.cuhk.edu.hk

**7th EUROPT Workshop on
ADVANCES IN CONTINUOUS OPTIMIZATION
Remagen, Germany,
July 3 - 4, 2009**

<http://www.rheinahrcampus.de/europt2009>

(FINAL ANNOUNCEMENT)

This international workshop is organized by the EURO Working Group on Continuous Optimization (EUROPT; <http://www.iam.metu.edu.tr/EUROPT>) as a satellite meeting before the EURO XXIII conference in Bonn (<http://www.euro-2009.de>). The workshop covers all aspects of continuous optimization and will be held in Remagen, situated about 20 kilometers south of Bonn at the river Rhine.

All the information can be found in the conference web site and in EUROPT Newsletter N.12 <http://www.iam.metu.edu.tr/EUROPT/Newsletter12-EUROPT.pdf>

IMPORTANT DAYS

Abstract submission: April 10, 2009
Notification of acceptance: April 20, 2009
Early Registration: April 30, 2009
Conference: July 3-4, 2009

**Second Global Conference on Power and Optimization PCO2009
June 1-3,2009, Bali, Indonesia**

<http://www.engedu2.net>

(FINAL ANNOUNCEMENT)

All the information can be found in the conference web site and in EUROPT Newsletter N.12 <http://www.iam.metu.edu.tr/EUROPT/Newsletter12-EUROPT.pdf>

IMPORTANT DAYS

Receipt of Full Papers : February 1, 2009
Notification for Peer Review : March 1, 2009
Camera ready Paper : April 15, 2009
Registration with full payment : April 15, 2009

Special Issues and Special Offers

- Recently, *Optimization: A Journal of Mathematical Programming and Operations Research*, published a **Special Issue on Continuous Optimization in Finance**, guest-edited by Professor Weber. In his editorial, Professor Weber mentions that the EURO Working Group on Continuous Optimization is strongly supporting this new research area.

The contents of the Special Issue is freely available in http://www.informaworld.com/smpp/title_content=g909684729_db=all and includes a summary of the articles in the special issue.

Individual members of the EURO Working Group on Continuous Optimization are offered a reduced subscription rate to *Optimization*. This would be very similar to the offer to *Optimization Methods and Software* currently available to EUROPT members (see <http://www.iam.metu.edu.tr/EUROPT/Newsletter14-EUROPT.pdf>).

The reduced annual subscription rate would be GB Pounds 60/US Dollars 100, the subscription is online-only and can be requested via an online order form.

For more details about the Journal, please visit www.tandf.co.uk/journals/optimization.

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Tel: +44 207 017 4506; Fax: +44 207 017 6714

www.informaworld.com/journals

- A final version of the monograph "*Lectures on Stochastic Programming*" by Alexander Shapiro, Darinka Dentcheva, and Andrzej Ruszczyński can be downloaded from: <http://www2.isye.gatech.edu/people/faculty/Alexshapiro/SPbook.pdf>
- Taylor Francis is delighted to offer free online access to a collection of 2008 articles published in *Optimization*.

To view the articles available and for information on how to claim access, visit www.tandf.co.uk/journals/pdf/freeaccess/gopt.pdf

Teaching activities

"Towards Implementable Continuous Stochastic Optimization"

by Leonidas Sakalauskas, Institute of Mathematics and Informatics, Lithuania

E-mail: sakal@ktl.mii.lt

Analysis of optimization algorithms is mainly grounded by convergence studies which gives us a knowledge about algorithm behavior, when a number of iterations infinitely increased. However, in real situations optimal decision must be made only after the finite number of computer realizable steps. Thus, the methods described in principle and implementable ones are

often distinguished in articles and books devoted to numerical implementation of optimization algorithms.

The method is considered as implementable if a simple definition is given for all parameters of the method, ensuring the finding of optimum with a admissible accuracy after finite number of computer realizable procedures ((see, i.e., Polak (1971), Gill et al (1981), Poliak (1987)). The topic of algorithmic implementability is especially complicated in stochastic optimization, because of randomization of algorithms and the great volume of computations, needed to solve the optimizatiuos problem. In this paper the concept of implementable continuous stochastic optimization is briefly presented by finite series of Monte-Carlo estimators addressing to topics related with termination rules and rational setting of parameters of algorithms, etc Our approach distinguishes by treatment of the accuracy of the solution in a statistical manner, testing the hypothesis of optimality according to statistical criteria and estimating confidence intervals of the objective (and constraint) functions. The rule for adjusting the Monte-Carlo sample size is introduced which ensures the convergence by linear rate and enables us to solve the stochastic optimization problem using a reasonable number of Monte-Carlo trials. More about concept presented see in (Sakalauskas, 2000, 2002, 2004).

Let consider the stochastic optimization problem in general, when expectation are included to the objective function:

$$F(x) = Ef(x, \xi) \mapsto \min, x \in R^n \quad (1)$$

where $F : R^n \mapsto R$ is the objective scalar function, $\xi \in \Omega$ is an elementary event in a probability space (Ω, Σ, P_x) , the function $f : R^n \times \Omega \mapsto R^m$ satisfies certain conditions on integrability and differentiability, the measure P_x is absolutely continuous and parameterized with respect to x in general, and E is the symbol of mathematical expectation.

Let us introduce Monte-Carlo estimators needed for construction of a stochastic optimization procedure. Suppose it is possible to get finite sequences of realizations (trials) of ξ at any point x and after that to compute the values of functions f for these realizations. Thus, assume the Monte-Carlo sample to be given for some $x \in R^n$:

$$Y = (y^1, y^2, \dots, y^N), \quad (2)$$

where y^i are independent random vectors identically distributed with the density $p(x, \cdot) : \Omega \mapsto R_+$. Monte-Carlo estimators of the objective and constraint functions and their sampling variances are as follows:

$$\tilde{F}(x) = \frac{1}{N} \sum_{j=1}^N f(x, y^j), \quad (3)$$

$$\tilde{D}_F^2(x) = \frac{1}{N-1} \sum_{j=1}^N (f(x, y^j) - \tilde{F}(x))^2. \quad (4)$$

Let us consider also the Monte-Carlo estimator of the gradient of the objective function

$$\tilde{G} = \frac{1}{N} \sum_{j=1}^N G^j, \quad (5)$$

which is rather often available from the same random sample, using the techniques of stochastic differentiation, $G^j \equiv G(x, y^j)$ is the stochastic gradient here, namely, $EG(x, y^j) = \nabla F(x)$ (see,

Rubinstein and Shapiro (1993), Bartkute and Sakalauskas (2007)). The sampling covariance matrix $A = \frac{1}{N} \sum_{j=1}^N (G^j - \tilde{G}(x))(G^j - \tilde{G}(x))^T$ will be used later on, too.

Let us consider the algorithm for stochastic gradient search to solve (1). Assume, certain initial point $x^0 \in R^n$ be given, random sample (3) of a certain initial size N^0 be generated at this point, and corresponding Monte-Carlo estimators be computed. Now, the iterative stochastic procedure of gradient search might be introduced:

$$x^{t+1} = x^t - \rho \tilde{G}(x^t), \quad (6)$$

where the Monte-Carlo sample size is taken at each step inversely proportional to square norm of gradient estimator:

$$N^{t+1} = \min \left(\max \left(\left[\frac{n, Fish(\gamma, n, N^t - n)}{\rho(\tilde{G}(x^t))'(A(x^t))^{-1}\tilde{G}(x^t)} \right] + n, N_{min} \right), N_{max} \right), \quad (7)$$

$\rho > 0$ is certain step-length multiplier, $Fish(\gamma, n, N^t - n)$ is the γ -quantile of the Fisher distribution with $(n, N^t - n)$ degrees of freedom. During optimization the statistical hypothesis of equality of gradient to zero is tested and the sampling confidence interval of the objective function is computed. Thus, the optimization is terminated if the statistical criterion does not contradict to hypothesis of equality of gradient to zero:

$$(N - n)(\tilde{\nabla}_x L)' A^{-1}(\tilde{\nabla}_x L)/n \leq Fish(\mu, n, N - n),$$

and the estimated length of the confidence interval of the objective function does not exceed the admissible accuracy ε :

$$2\eta_\beta D_F / \sqrt{N} \leq \varepsilon$$

where η_β is the β -quintile of the standard normal distribution.

It is proved by martingales approach that the approach developed ensures convergence a.s. with linear rate. The numerical study and the practical examples corroborate theoretical conclusions and show that the procedures developed enable us to solve SP problems with a sufficient permissible accuracy from the acceptable volume of computations. In general, the approach presented enables us to solve the stochastic optimization problem with admissible accuracy using only several times more computations as to compare with number of trials needed to estimate one value of the objective function. These results are extended also to constraint optimization with probabilistic and deterministic constraints as well (see, Sakalauskas, 2000, 2002, 2004).

References:

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Editor's personal comments

Dear members of EUROPT!

This issue is the last one before the 7th EUROPT Workshop "Advances in Continuous Optimization" which will be held in the beginning of July the next at Remagen, immediately followed by the XXIII EURO in Bonn. On the threshold of these very important meetings for all our operations research community, this issue includes detailed information about dates, committees, invited speakers, submission deadlines, and other particular details of several forthcoming events around the world. I am thankful to all the colleagues that have sent most of this information, in particular to our friends Professors Kaisa Miettinen and Gerhard Wilhelm Weber. I am also very grateful to our friend Prof. Leonidas Sakalauskas for his very important contribution to the section "Problem and Teaching Activities" with a nice short introduction to stochastic optimization.

It will be a great pleasure to see you all in Remagen.

On behalf of the Editorial Board of EUROPT Newsletter,
Domingos M Cardoso

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