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Swarm, Evolutionary, and Memetic Computing

First International Conference on Swarm, Evolutionary, and Memetic Computing, SEMCCO 2010
Chennai, India, December 16-18, 2010
Proceedings

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Volume Editors

Bijaya Ketan Panigrahi
Indian Institute of Technology
Department of Electrical Engineering
New Delhi, India
E-mail: bijayaketan.panigrahi@gmail.com

Swagatam Das
Jadavpur University
Department of Electronics and Communication Engineering
Kolkata, India
E-mail: swagatamdas19@yahoo.co.in

Ponnuthurai Nagaratnam Suganthan
Nanyang Technological University
School of Electrical and Electronic Engineering
Singapore
E-mail: epnsugan@ntu.edu.sg

Subhransu Sekhar Dash
SRM University
Department of Electrical and Electronics Engineering
Chennai, India
E-mail: munu_dash_2k@yahoo.com

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Preface

This LNCS volume contains the papers presented at the First Swarm, Evolutionary and Memetic Computing Conference (SEMCCO 2010) held during December 16—18, 2010 at SRM University, Chennai, in India. SEMCCO 2010 marked the beginning of a prestigious international conference series that aims at bringing together researchers from academia and industry to report and review the latest progress in the cutting-edge research on swarm, evolutionary, and memetic computing, to explore new application areas, to design new bio-inspired algorithms for solving specific hard optimization problems, and finally to create awareness on these domains to a wider audience of practitioners.

SEMCCO 2010 received 225 paper submissions from 20 countries across the globe. After a rigorous peer-review process involving 610 reviews in total, 90 full-length articles were accepted for oral presentation at the conference. This corresponds to an acceptance rate of 40% and is intended for maintaining the high standards of the conference proceedings. The papers included in this LNCS volume cover a wide range of topics in swarm, evolutionary, and memetic computing algorithms and their real-world applications in problems selected from diverse domains of science and engineering.

The conference featured four distinguished keynote speakers. Kalyanmoy Debís talk on 'Preference-Based Evolutionary Multiobjective Optimization' focused on three different possibilities of integrating multiple criteria decision-making (MCDM) techniques with an evolutionary multi-objective optimization (EMO) procedure and presented some recent research results. The lecture generated great interest among the participants of SEMCCO in paying more attention to this important and overlooked K.C. Tan's talk on 'Handling Uncertainties in Evolutionary Multi-objective Optimization' featured the challenges faced in handling uncertainties in EMO. Specifically, the impact of these uncertainties on multi-objective optimization was described along with a focus on the approaches/modifications to basic algorithm design for better and robust EMO performance. P.N. Suganthan, in his lecture on 'Evolutionary Algorithms with Diversity and Local Search Enhancements,' first addressed the issue of diversity management in populated evolutionary algorithms. He introduced some commonly used diversity measurement methods and subsequently presented a few different ways of enhancing the diversity of populations and demonstrated the benefits of diversity enhancement operations. He also demonstrated the integration of diversity enhancement and local search methods as two complementary operations to enhance the overall performance of evolutionary algorithms. Yew Soon Ong's lecture on 'Towards Memetic Computing' provided insight into the multi faceted view of meme in memetic computation. He reviewed the design issues anchoring on hybridization aspects of memetic computation. Subsequently, his talk focused on the algorithmic aspects and properties of a recently proposed probabilistic memetic framework that formalizes the design of adaptive hybrids or adaptive memetic algorithms as opposed to the typical ad-hoc means of

design. Finally he took a peek into the journey toward memetic computing and uncovered some key aspects of the agent computing framework as an important means for enriching memetic computation research.

SEMCCO 2010 also included two tutorials, which were free to all conference participants. The tutorial delivered jointly by Swagatam Das and Rammohan Mallipeddi on 'Differential Evolution: Foundations, Perspectives, and Engineering Applications' systematically introduced the main features of one of the most powerful real parameter optimization algorithms of current interest – differential evolution (DE). DE is a very simple algorithm, requiring only a few lines of code in most of the existing programming languages. Nonetheless, DE exhibits remarkable performance in optimizing a wide variety of optimization problems in terms of final accuracy, convergence speed, and robustness as evidenced by the consistently excellent performance in all of the competitions organized under the IEEE Congress on Evolutionary Computation (CEC, http://www3.ntu.edu.sg/home/epnsugan/). This tutorial inspired both novices and experts of DE to a greater understanding of the very fundamentals of its working principles. The other tutorial by B.K. Panigrahi and S. Paramsivam was on "Applied Swarm Intelligence: A Power System Perspective" and included the application of swarm algorithms to power systems, power electronics and drives area. The tutorial made an excellent start to the three-day conference.

We take this opportunity to thank the authors of all submitted papers for their hard work, adherence to the deadlines and patience with the review process. The quality of a refereed volume depends mainly on the expertise and dedication of the reviewers. We are indebted to the Program Committee members who not only produced excellent reviews but also did these in the short timeframes that they were given.

We would also like to thank our sponsors for providing all the support and financial assistance. First, we are indebted to SRM University administration (The Chancellor, the Vice Chancellor, Pro Vice-Chancellor, Registrar, Director of Engineering and Technology, and faculty colleagues and administrative personnel) for supporting our cause and encouraging us to organize the conference at SRM University, Chennai. We would like to express our heartfelt thanks to Meng Hiot Lim and Yuhui Shi for providing valuable guidelines and inspiration to overcome various difficulties in the process of organizing this conference. The financial assistance from SRM University and the Department of Science and Technology (DST), Government of India, and several others in meeting a major portion of the expenses is highly appreciated. We would also like to thank the participants of this conference, who have considered the conference above all hardships. Finally, we would like to thank all the volunteers whose tireless efforts in meeting the deadlines and arranging every detail made sure that the conference could run smoothly. We hope the readers of these proceedings find the papers inspiring and enjoyable.

December 2010

Bijaya Ketan Panigrahi
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