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Computational Collective Intelligence

Technologies and Applications

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Preface

This volume contains Part I of the proceedings of the 4th International Conference on Computational Collective Intelligence (ICCCI 2012) held in Ho Chi Minh City, Vietnam, November 28–30, 2012. The conference was organized by Wroclaw University of Technology (Poland) in cooperation with the University of Information Technology (Vietnam National University VNU-HCM, Vietnam). The conference was run under the patronage of the Committee of Informatics, Polish Academy of Sciences, and the IEEE SMC Technical Committee on Computational Collective Intelligence.

Following the successes of the First International Conference on Computational Collective Intelligence: Semantic Web, Social Networks and Multiagent Systems (ICCCI 2009) held in Wroclaw, Poland, the Second International Conference on Computational Collective Intelligence (ICCCI 2010) held in Kaohsiung, Taiwan, and the Third International Conference on Computational Collective Intelligence (ICCCI 2011) held in Gdynia, Poland, this conference continued to provide an internationally respected forum for scientific research in the computer-based methods of collective intelligence and their applications.

Computational collective intelligence (CCI) is most often understood as a sub-field of artificial intelligence (AI) dealing with soft computing methods that enable making group decisions or processing knowledge among autonomous units acting in distributed environments. Methodological, theoretical, and practical aspects of CCI are considered as the form of intelligence that emerges from the collaboration and competition of many individuals (artificial and/or natural). The application of multiple computational intelligence technologies such as fuzzy systems, evolutionary computation, neural systems, consensus theory, etc., can support human and other collective intelligence, and create new forms of CCI in natural and/or artificial systems. Three subfields of application of computational intelligence technologies to support various forms of collective intelligence are of special attention but are not exclusive: Semantic Web (as an advanced tool increasing collective intelligence), social network analysis (as the field targeted to the emergence of new forms of CCI), and multiagent systems (as a computational and modeling paradigm especially tailored to capture the nature of CCI emergence in populations of autonomous individuals).

The ICCCI 2012 conference featured a number of keynote talks, oral presentations, and invited sessions, closely aligned to the theme of the conference. The conference attracted a substantial number of researchers and practitioners from all over the world, who submitted their papers for the main track subdivided into 10 thematic streams and 10 special sessions.

The main track streams, covering the methodology and applications of CCI, included: Knowledge Integration, Data Mining for Collective Processing, Fuzzy, Modal and Collective Systems, Nature-Inspired Systems, Language Processing

Systems, Social Networks and Semantic Web, Agent and Multi-agent Systems, Classification and Clustering Methods, Multi-dimensional Data Processing, Web Systems, Intelligent Decision Making, Methods for Scheduling, Image and Video Processing.

The special sessions, covering some specific topics of particular interest, included: Collective Intelligence in Web Systems, Computational Intelligence for Business Collaboration, Advanced Data Mining Techniques and Applications, Industrial Applications of Computational Collective Intelligence, Cooperative Problem Solving, Computational Swarm Intelligence, Collective Intelligence with Semantic Technology, Smart Solutions in Computational Collective Intelligence, Semantic Methods for Knowledge Discovery and Communication, Mobile Intelligent Sensors and Systems Technology in Radial Assistive Living, and Modelling and Optimization Techniques for Business Intelligence.

We received 397 submissions from 33 countries. Each paper was reviewed by two to four members of the International Program Committee and international reviewer board. Only 113 best papers were selected for oral presentation and publication in the two volumes of the *Lecture Notes in Artificial Intelligence* series.

We would like to express our sincere thanks to the Honorary Chairs, Phan Thanh Binh, President of National University VNU-HCM (Vietnam), Tadeusz Więckowski, Rector of Wrocław University of Technology (Poland), and Pierre Lévy, University of Ottawa (Canada), for their support.

We also would like to express our thanks to the keynote speakers, Philip Chen, President of IEEE SMC, University of Texas (USA), Witold Pedrycz, University of Alberta (Canada), Longbing Cao, University of Technology Sydney (Australia), and Adam Grzech, Wrocław University of Technology (Poland), for their world-class plenary speeches.

Special thanks go to the Organizing Chairs (Anh Duc Duong and Radosław Katarzyniak) for their efforts in the organizational work. Thanks are due to the Program Co-chairs, Program Committee, and the board of reviewers, essential for reviewing the papers to ensure the high quality of accepted papers. We thank the Publicity Chairs, Special Sessions Chairs, and the members of the Local Organizing Committee.

We thank the sponsors, the National Foundation for Science and Technology Development (Nafosted, Vietnam), Inha University (Korea), and Hue University (Vietnam).

Finally, we cordially thank all the authors, presenters, and delegates for their valuable contributions to this successful event. The conference would not have been possible without their support.

It is our pleasure to announce that the conferences of ICCCI series are closely cooperating with the Springer journal *Transactions on Computational Collective Intelligence*, and the IEEE SMC Technical Committee on *Transactions on Computational Collective Intelligence*.

We hope and intend that ICCCI 2012 significantly contributes to the fulfillment of the academic excellence and leads to even greater successes of ICCCI events in the future.

November 2012

Ngoc Thanh Nguyen
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Speech Title: *Modelling, Analysis and Learning of Ubiquitous Intelligence*

Adam Grzech, Wroclaw University of Technology, Poland
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CIBC 2012: Computational Intelligence for Business Collaboration
Organizers: *Jason J. Jung and Huu-Hanh Hoang*

ADMTA 2012 on Advanced Data Mining Techniques and Applications
Organizers: *Bay Vo, Tzung-Pei Hong, and Le Hoai Bac*

IACCI 2012 on Industrial Applications of Computational Collective Intelligence
Organizers: *Van Tien Do*

CPS 2012: Special Session on Cooperative Problem Solving
Organizers: *Piotr Jedrzejowicz and Dariusz Barbucha*

CSI 2012: Computational Swarm Intelligence
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CIST 2012: Collective Intelligence with Semantic Technology
Organizers: *Geun Sik Jo and Trong Hai Duong*

SmartS 2012: Smart Solutions in Computational Collective Intelligence
Organizers: *Ondrej Krejcar and Peter Brida*

MissTRAL 2012: Mobile Intelligent Sensors and Systems Technology in Radial Assistive Living
Organizers: *Marek Penhaker, Martin Černý, and Martin Augustynek*

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