

Yves Demazeau
Michal Pěchoucěk
Juan M. Corchado
Javier Bajo Pérez (Eds.)

Advances on Practical Applications of Agents and Multiagent Systems

9th International Conference on Practical
Applications of Agents and Multiagent Systems

 Springer

Advances in Intelligent and Soft Computing

88

Editor-in-Chief: J. Kacprzyk

Advances in Intelligent and Soft Computing

Editor-in-Chief

Prof. Janusz Kacprzyk
Systems Research Institute
Polish Academy of Sciences
ul. Newelska 6
01-447 Warsaw
Poland
E-mail: kacprzyk@ibspan.waw.pl

Further volumes of this series can be found on our homepage: springer.com

- Vol. 75. X.Z. Gao, A. Gaspar-Cunha, M. Köppen, G. Schaefer, and J. Wang (Eds.) *Soft Computing in Industrial Applications, 2010* ISBN 978-3-642-11281-2
- Vol. 76. T. Bastiaens, U. Baumöl, and B.J. Krämer (Eds.) *On Collective Intelligence, 2010* ISBN 978-3-642-14480-6
- Vol. 77. C. Borgelt, G. González-Rodríguez, W. Trutschnig, M.A. Lubiano, M.Á. Gil, P. Grzegorzewski, and O. Hryniewicz (Eds.) *Combining Soft Computing and Statistical Methods in Data Analysis, 2010* ISBN 978-3-642-14745-6
- Vol. 78. B.-Y. Cao, G.-J. Wang, S.-Z. Guo, and S.-L. Chen (Eds.) *Fuzzy Information and Engineering 2010* ISBN 978-3-642-14879-8
- Vol. 79. A.P. de Leon F. de Carvalho, S. Rodríguez-González, J.F. De Paz Santana, and J.M. Corchado Rodríguez (Eds.) *Distributed Computing and Artificial Intelligence, 2010* ISBN 978-3-642-14882-8
- Vol. 80. N.T. Nguyen, A. Zgrzywa, and A. Czyzewski (Eds.) *Advances in Multimedia and Network Information System Technologies, 2010* ISBN 978-3-642-14988-7
- Vol. 81. J. Düh, H. Hufnagl, E. Juritsch, R. Pfleigl, H.-K. Schimany, and Hans Schönegger (Eds.) *Data and Mobility, 2010* ISBN 978-3-642-15502-4
- Vol. 82. B.-Y. Cao, G.-J. Wang, S.-L. Chen, and S.-Z. Guo (Eds.) *Quantitative Logic and Soft Computing 2010* ISBN 978-3-642-15659-5
- Vol. 83. J. Angeles, B. Boulet, J.J. Clark, J. Kovács, and K. Siddiqi (Eds.) *Brain, Body and Machine, 2010* ISBN 978-3-642-16258-9
- Vol. 84. Ryszard S. Choraś (Ed.) *Image Processing and Communications Challenges 2, 2010* ISBN 978-3-642-16294-7
- Vol. 85. Á. Herrero, E. Corchado, C. Redondo, and Á. Alonso (Eds.) *Computational Intelligence in Security for Information Systems 2010* ISBN 978-3-642-16625-9
- Vol. 86. E. Mugellini, P.S. Szczepaniak, M.C. Pettenati, and M. Sokhn (Eds.) *Advances in Intelligent Web Mastering – 3, 2011* ISBN 978-3-642-18028-6
- Vol. 87. E. Corchado, V. Snášel, J. Sedano, A.E. Hassanien, J.L. Calvo, and D. Ślęzak (Eds.) *Soft Computing Models in Industrial and Environmental Applications, 6th International Conference SOCO 2011* ISBN 978-3-642-19643-0
- Vol. 88. Y. Demazeau, M. Pěchouček, J.M. Corchado, and J. Bajo (Eds.) *Advances on Practical Applications of Agents and Multiagent Systems, 2011* ISBN 978-3-642-19874-8

Yves Demazeau, Michal Pěchoucěk,
Juan M. Corchado, and Javier Bajo (Eds.)

Advances on Practical Applications of Agents and Multiagent Systems

9th International Conference on Practical
Applications of Agents and Multiagent Systems



Editors

Prof. Yves Demazeau
Laboratoire d'Informatique de Grenoble
Centre National de la Recherche
Scientifique
Maison Jean Kuntzmann
110 av. de la Chimie
F-38041 Grenoble
France

Prof. Michal Pěchouček
Czech Technical University
Department of Cybernetics
Technická 2
16627 Prague 6
Czech Republic

Prof. Juan M. Corchado
Universidad de Salamanca
Departamento de Informática
y Automática
Facultad de Ciencias
Plaza de la Merced S/N
37008 Salamanca
Spain
E-mail: corchado@usal.es

Prof. Javier Bajo Pérez
Universidad Pontificia de Salamanca
Escuela Universitaria de Informática
Compañía 5
37002 Salamanca
Spain

ISBN 978-3-642-19874-8

e-ISBN 978-3-642-19875-5

DOI 10.1007/978-3-642-19875-5

Advances in Intelligent and Soft Computing

ISSN 1867-5662

Library of Congress Control Number: 2011923222

©2011 Springer-Verlag Berlin Heidelberg

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilm or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable for prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typeset & Cover Design: Scientific Publishing Services Pvt. Ltd., Chennai, India.

Printed on acid-free paper

5 4 3 2 1 0

springer.com

Preface

Research on Agents and Multi-Agent Systems has matured during the last decade and many effective applications of this technology are now deployed. An international forum to present and discuss the latest scientific developments and their effective applications, to assess the impact of the approach, and to facilitate technology transfer, has become a necessity.

PAAMS, the International Conference on Practical Applications of Agents and Multi-Agent Systems is the international yearly tribune to present, to discuss, and to disseminate the latest developments and the most important outcomes related to real-world applications. It provides a unique opportunity to bring multi-disciplinary experts, academics and practitioners together to exchange their experience in the development of Agents and Multi-Agent Systems.

This volume presents the papers that have been accepted for the 2011 edition. These articles capture the most innovative results and this year's trends: Finance and Trading, Information Systems and Organisations, Leisure Culture and Interactions, Medicine and Cloud Computing, Platforms and Adaptation, Robotics and Manufacturing, Security and Privacy, Transports and Optimisation paper has been reviewed by three different reviewers, from an international committee composed of 75 members from 24 different countries. From the 81 submissions received, 15 were selected for full presentation at the conference, and 24 were accepted for short presentation at the conference.

We would like to thank all the contributing authors, as well as the members of the Program Committee and the Organizing Committee for their hard and highly valuable work. Their work has helped to contribute to the success of the PAAMS'11 event. Thanks for your help, PAAMS'11 wouldn't exist without your contribution.

Yves Demazeau
Frank Dignum
PAAMS'11 Program Co-chairs

Juan Manuel Corchado
Javier Bajo
PAAMS'11 Organizing Co-chairs

Organization

General Co-chairs

Yves Demazeau	Centre National de la Recherche Scientifique (France)
Michal Pěchouček (Co-chair)	Czech Technical University in Prague (Czech Republic)
Juan M. Corchado	University of Salamanca (Spain)
Javier Bajo	Pontifical University of Salamanca (Spain)

Advisory Board

Juan Pavón	Universidad Complutense de Madrid (Spain)
Frank Dignum	Utrecht University (The Netherlands)

Program Committee

Yves Demazeau (Co-chair)	Centre National de la Recherche Scientifique (France)
Michal Pěchouček (Co-chair)	Czech Technical University in Prague (Czech Republic)
Carole Adam	University of Grenoble (France)
Frederic Amblard	University of Toulouse (France)
Francesco Amigoni	Politecnico di Milano (Italy)
Luis Antunes	University of Lisbon (Portugal)
Javier Bajo	Pontifical University of Salamanca (Spain)
Zbigniew Banaszak	Warsaw University of Technology (Poland)
Fabio Luigi Bellifemine	Telecom Italia (Italy)
Olivier Boissier	Ecole Nationale Superieure des Mines de Saint Etienne (France)
Juan A. Botía	University of Murcia (Spain)
Vicente Botti	Polytechnic University of Valencia (Spain)
Stefano Bromuri	University of Applied Sciences Western Switzerland (Switzerland)
Sven Brueckner	Jacobs Technology Inc. (USA)
Valerie Camps	University of Toulouse (France)
Longbing Cao	University of Technology Sydney (Australia)

VIII

Organization

Lawrence Cavedon
Pierre Chevaillier
Juan Manuel Corchado
Keith Decker
Frank Dignum
Virginia Dignum
Alexis Drogoul

Julie Dugdale
Edmund Durfee
Partha S Dutta
Amal Elfallah
Torsten Eymann
Rubén Fuentes
Francisco Garijo
Khaled Ghedira

Sylvain Giroux
Pierre Glize
Vladimir Gorodetski
Dominic Greenwood
Kasper Hallenborg
Benjamin Hirsch
Tom Holvoet
Shinichi Honiden

Jomi Hübner
Toru Ishida
Takayuki Ito
Vicente Julian
Achilles Kameas
Jeffrey O. Kephart
Franziska Kluegl
Matthias Klusch
Martin Kollingbaum
Jaroslaw Kozlak

Zakaria Maamar
Rene Mandiau
Philippe Mathieu
Eric Matson
Fabien Michel
José M. Molina
Mirko Morandini
Joerg Mueller

RMIT Melbourne (Australia)
University of Brest (France)
University of Salamanca (Spain)
University of Delaware (USA)
Utrecht University (The Netherlands)
Utrecht University (The Netherlands)
Institut de Recherche pour l'Developpement
(Vietnam)
University of Grenoble (France)
University of Michigan (USA)
Rolls-Royce (United Kingdom)
University of Paris 6 (France)
University of Bayreuth (Germany)
University Computense de Madrid (Spain)
Telefonica I+D (Spain)
National School of Computer Sciences
(Tunisia)
University of Sherbrooke (Canada)
University of Toulouse (France)
University of Saint Petersburg (Russia)
Whitestein Technologies (Switzerland)
University of Southern Denmark (Denmark)
Technical University Berlin (Germany)
Catholic University of Leuven (Belgium)
National Institute of Informatics Tokyo
(Japan)
Federal University of Santa Catarina (Brazil)
University of Kyoto (Japan)
Massachusetts Institute of Technology (USA)
Polytechnic University of Valencia (Spain)
University of Patras (Greece)
IBM Research (USA)
University of Örebro (Sweden)
DFKI (Germany)
University of Aberdeen (United Kingdom)
University of Science and Technology in
Krakow (Poland)
Zayed University (United Arab Emirates)
University of Valenciennes (France)
University of Lille (France)
Purdue University (USA)
University of Reims (France)
Universidad Carlos III de Madrid (Spain)
University of Trento (Italy)
Clausthal University of Technology
(Germany)

Peter Novak	Czech Technical University in Prague (Czech Republic)
Eugenio Oliveira	University of Porto (Portugal)
Sascha Ossowski	University of Rey Juan Carlos (Spain)
Julian Padget	University of Bath (United Kingdom)
Adolfo López Paredes	University of Valladolid (Spain)
Juan Pavón	Universidad Complutense de Madrid (Spain)
Jeremy Pitt	Imperial College of London (United Kingdom)
Juan Rodriguez Aguilar	Artificial Intelligence Research Institute (Spain)
Simon Thompson	British Telecom IIS Research Centre (United Kingdom)
Paolo Torroni	University of Bologna (Italy)
Rainer Unland	University of Duisburg (Germany)
Domenico Ursino	University of Reggio Calabria (Italy)
Birna van Riemsdijk	University of Delft (The Netherlands)
Jacques Verriet	Embedded Systems Institute (The Netherlands)
Jiri Vokrinek	Czech Technical University in Prague (Czech Republic)
Danny Weyns	Catholic University of Leuven (Belgium)
Niek Wijngaards	Thales, D-CIS lab (The Netherlands)
Gaku Yamamoto	IBM and Tokyo Institute of Technology (Japan)

Organizing Committee

Juan M. Corchado (Chairman)	University of Salamanca (Spain)
Javier Bajo (Co-Chairman)	Pontifical University of Salamanca (Spain)
Juan F. De Paz	University of Salamanca (Spain)
Sara Rodríguez	University of Salamanca (Spain)
Dante I. Tapia	University of Salamanca (Spain)
Emilio Corchado	University of Salamanca (Spain)
Fernando de la Prieta Pintado	University of Salamanca (Spain)
Davinia Carolina Zato Domínguez	University of Salamanca (Spain)

Contents

Information and Organisations

A J-MADeM Agent-Based Social Simulation to Model Urban Mobility	1
<i>Francisco Grimaldo, Miguel Lozano, Fernando Barber, Alejandro Guerra-Hernández</i>	
Diversity of the Knowledge Base in Organizations: Results of an Agent-Based Simulation	13
<i>Friederike Wall</i>	
Weighing Communication Overhead against Travel Time Reduction in Advanced Traffic Information Systems	21
<i>Rutger Claes, Tom Holvoet</i>	
Information Extraction System Using Indoor Location and Activity Plan	33
<i>Bjørn Grønbæk, Pedro Valente, Kasper Hallenborg</i>	
Using Multi-Agent Systems to Visualize Text Descriptions	39
<i>Edgar Bolaño-Rodríguez, Juan C. González-Moreno, David Ramos-Valcarcel, Luiz Vázquez-López</i>	

Robotics and Manufacturing

Empowering Adaptive Manufacturing with Interactive Diagnostics: A Multi-Agent Approach	47
<i>Thomas M. Hubauer, Christoph Legat, Christian Seitz</i>	

Multi-Agent Cooperation for Advanced Teleoperation of an Industrial Forklift in Real-Time Environment	57
<i>F.J. Serrano Rodríguez, J.F. Rodríguez-Aragón, B. Curto Diego, V. Moreno Rodilla</i>	

Map Partitioning to Approximate an Exploration Strategy in Mobile Robotics	63
<i>Guillaume Lozenguez, Lounis Adouane, Aurélie Beynier, Philippe Martinet, Abdel-Illah Mouaddib</i>	

ROAR: Resource Oriented Agent Architecture for the Autonomy of Robots	73
<i>Arnaud Degroote, Simon Lacroix</i>	

Engineering Agent Frameworks: An Application in Multi-Robot Systems	79
<i>Jérôme Lacouture, Victor Noël, Jean-Paul Arcangeli, Marie-Pierre Gleizes</i>	

Security and Privacy

Lightweight Trusted Routing for Wireless Sensor Networks	87
<i>Laurent Vercouter, Jean-Paul Jamont</i>	

Privacy-Preserving Strategy for Negotiating Stable, Equitable and Optimal Matchings	97
<i>Maxime Morge, Gauthier Picard</i>	

Searching Flocks in Peer-to-Peer Networks	103
<i>Hugo Pommier, Benoît Romito, François Bourdon</i>	

Securing Mobile Agents via Combining Encrypted Functions	109
<i>Hamed Aouadi</i>	

A Multi-Agent System with Distributed Bayesian Reasoning for Network Fault Diagnosis	113
<i>Álvaro Carrera, Javier González-Ordás, Javier García-Algarra, Pablo Arozarena, Mercedes Garijo</i>	

Platforms and Adaptation

Using TraSMAPI for Developing Multi-Agent Intelligent Traffic Management Solutions	119
<i>Ivo J.P.M. Timóteo, Miguel R. Araújo, Rosaldo J.F. Rossetti, Eugénio C. Oliveira</i>	

Contents	XIII
----------	------

EPIS: A Grid Platform to Ease and Optimize Multi-agent Simulators Running	129
<i>E. Blanchart, C. Cambier, C. Canape, B. Gaudou, T.-N. Ho, T.-V. Ho, C. Lang, F. Michel, N. Marilleau, L. Philippe</i>	
Formal Specification of Holonic Multi-Agent Systems: Application to Distributed Maintenance Company	135
<i>Belhassen Mazigh, Vincent Hilaire, Abderrafiaa Koukam</i>	
Controlling Bioprocesses Using Cooperative Self-organizing Agents	141
<i>Sylvain Videau, Carole Bernon, Pierre Glize, Jean-Louis Uribelarrea</i>	
Towards Context-Based Inquiry Dialogues for Personalized Interaction	151
<i>Helena Lindgren</i>	

Transports and Optimisation

Modelling Driver Interdependent Behaviour in Agent-Based Traffic Simulations for Disaster Management ...	163
<i>David Handford, Alex Rogers</i>	
Agent-Based Integrated Decision Making for Autonomous Vehicles in Urban Traffic	173
<i>Maksims Fiosins, Jelena Fiosina, Jörg P. Müller, Jana Görmer</i>	
Towards Urban Traffic Regulation Using a Multi-Agent System	179
<i>Neila Bhouri, Flavien Balbo, Suzanne Pinson</i>	
Application of Holonic Approach for Transportation Modelling and Optimising	189
<i>Jarosław Koźlak, Sebastian Pisarski, Małgorzata Źabińska</i>	
A Multiagent System Approach to Grocery Shopping.....	195
<i>Hongying Du, Michael N. Huhns</i>	

Leisure, Culture, Interactions

Artificial Snow Optimization in Winter Sport Destinations Using a Multi-agent Simulation	201
<i>M. Revilloud, J.-C. Loubier, M. Doctor, M. Kanevski, V. Timonin, M. Schumacher</i>	

Middle Age Social Networks: A Dynamic Organizational Study	211
<i>L. Lacomme, V. Camps, Y. Demazeau, F. Hautefeuille, B. Jouve</i>	
From an Individual Perspective to a Team Perspective in Agent-Based Negotiation	217
<i>Víctor Sánchez-Anguix, Vicente Julián, Ana García-Fornes</i>	
An Exploratory Analysis for Designing Robust Interactions in Multi-Agent Systems	225
<i>Celia Gutiérrez and Iván García-Magariño</i>	
Comparison of DCSP Algorithms: A Case Study for Multi-agent Exploration	231
<i>Pierre Monier, Arnaud Doniec, Sylvain Piechowiak, René Mandiau</i>	
 Medicine and Cloud Computing	
Heterogeneous Multiagent Architecture for Dynamic Triage of Victims in Emergency Scenarios	237
<i>Estanislao Mercadal, Sergi Robles, Ramon Martí, Cormac J. Sreenan, Joan Borrell</i>	
A Decision Support System for Hospital Emergency Departments Built Using Agent-Based Techniques	247
<i>Manel Taboada, Eduardo Cabrera, Emilio Luque</i>	
An Agent-Based Dialog Simulation Technique to Develop and Evaluate Conversational Agents	255
<i>David Griol, Nayat Sánchez-Pi, Javier Carbó, José M. Molina</i>	
Cloud Computing Service for Managing Large Medical Image Data-Sets Using Balanced Collaborative Agents	265
<i>Raúl Alonso-Calvo, Jose Crespo, Victor Maojo, Alberto Muñoz, Miguel García-Remesal, David Pérez-Rey</i>	
Software Agents as Cloud Computing Services	271
<i>Ignacio Lopez-Rodriguez and Mario Hernandez-Tejera</i>	
 Finance and Trading	
Efficient Monitoring of Financial Orders with Agent-Based Technologies	277
<i>Philippe Mathieu and Olivier Brandouy</i>	
An Agent Task Force for Stock Trading	287
<i>Rui Pedro Barbosa and Orlando Belo</i>	

Contents	XV
Contracts Negotiation in Market Environments Taking into Consideration the Strength of Each Economic Player	299
<i>Lukasz Jankowski, Jarosław Koźlak, Małgorzata Źabińska</i>	
Bid Definition Method for Electricity Markets Based on an Adaptive Multiagent System	309
<i>Tiago Pinto, Zita Vale, Fátima Rodrigues, Hugo Moraes, Isabel Praça</i>	
Author Index	317

The series "Advances in Intelligent and Soft Computing" contains publications on various areas within the so-called soft computing, which include fuzzy sets, rough sets, neural networks, evolutionary computations, probabilistic and evidential reasoning, multi-valued logic, and related fields. The publications within "Advances in Intelligent and Soft Computing" are primarily textbooks and proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both theoretical and applied. An important feature of the series is the short publication time and world-wide distribution, allowing a rapid and broad dissemination of research results.

Yves Demazeau · Michal Pěchouček · Juan M. Corchado

Javier Bajo Pérez (Eds.)

Advances on Practical Applications of Agents and Multiagent Systems

PAAMS, the International Conference on Practical Applications of Agents and Multi-Agent Systems is the international yearly tribune to present, to discuss, and to disseminate the latest developments and the most important outcomes related to real-world applications. It provides a unique opportunity to bring multi-disciplinary experts, academics and practitioners together to exchange their experience in the development of Agents and Multi-Agent Systems. This volume presents the papers that have been accepted for the 2011 edition. These articles capture the most innovative results and this year's trends: Finance and Trading, Information Systems and Organisations, Leisure Culture and Interactions, Medicine and Cloud Computing, Platforms and Adaptation, Robotics and Manufacturing, Security and Privacy, Transports and Optimisation paper.

ISSN 1867-5662

ISBN 978-3-642-19874-8



9 783642 198748

Available
online

springerlink.com

➤ springer.com