Advances in Intelligent and Soft Computing

Editor-in-Chief: J. Kacprzyk
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, MÁ. 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

*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. Kovecses, and K. Siddiqi (Eds.)  
*Brain, Body and Machine, 2010*  
ISBN 978-3-642-16258-9

Vol. 84. Ryszard S. Choras (Ed.)  
*Image Processing and Communications Challenges 2, 2010*  
ISBN 978-3-642-16294-7

Vol. 85. Á. Herrero, E. Corchado, C. Redondo, and A. 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. Ślezak (Eds.)  
*Soft Computing Models in Industrial and Environmental Applications, 6th International Workshop SOCO 2011*  
ISBN 978-3-642-19643-0

Vol. 88. Y. Demazeau, M. Péchouček, J.M. Corchado, and J.B. Pérez (Eds.)  
*Advances on Practical Applications of Agents and Multiagent Systems, 2011*  
ISBN 978-3-642-19874-8

*Highlights in Practical Applications of Agents and Multiagent Systems, 2011*  
ISBN 978-3-642-19916-5
Highlights in Practical Applications of Agents and Multiagent Systems

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

Springer
Preface

PAAMS’11 Special Sessions are a very useful tool in order to complement the regular program with new or emerging topics of particular interest to the participating community. Special Sessions that emphasized on multi-disciplinary and transversal aspects, as well as cutting-edge topics were especially encouraged and welcome.

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 an evolution of the International Workshop on Practical Applications of Agents and Multi-Agent Systems. PAAMS is an 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 in the special sessions: Special Session on Agents Behaviours for Artificial Markets, Special Session on Multi-Agent Systems for safety and securit, Special Session on Web Mining and Recommender Systems, Special Session on Adaptive Multi-Agent System, Special Session on Integration of Artificial Intelligence Technologies in Resource-Constrained Devices, Special Session on Bio-Inspired and Multi-Agents Systems: Applications to Languages and Special Session on Agents for smart mobility.

We would like to thank all the contributing authors, as well as the members of the Program Committees of the Special Sessions 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.

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

Acknowledgements: This conference has been supported by Junta de Castilla y León (Spain).
Organization

Special Sessions

SS1 – Special Session on Agents Behaviours for Artificial Markets
SS2 – Special Session on Multi-Agent Systems for safety and security
SS3 – Special Session on Web Mining and Recommender Systems
SS4 – Special Session on Adaptative Multi-Agent System
SS5 – Special Session on Integration of Artificial Intelligence Technologies in Resource-Constrained Devices
SS6 – Special Session on Bio-Inspired and Multi-Agents Systems: Applications to Languages
SS7 – Special Session on Agents for smart mobility

Special Session on Agents Behaviours for Artificial Markets Committee

Mathieu Philippe (Co-chairman) Lille1 University (France)
Florian Hauser University of Innsbruck (Austria)
Olivier Brandouy University Paris 1 Panthéon Sorbonne (France)
Silvano Cincotti University of Genoa (Italy)

Special Session on Multi-Agent Systems for Safety and Security Committee

Antonio Fernández Caballero University of Castilla-La Mancha (Spain)
Elena María Navarro Martínez University of Castilla-La Mancha (Spain)
Francisco J. Garijo Telefónica (Spain)
Javier Jaen Universidad Politécnica de Valencia (Spain)
José Manuel Gascueña Universidad de Castilla La Mancha (Spain)
Maria Teresa López Universidad de Castilla La Mancha (Spain)
Special Session on Web Mining and Recommender Systems Committee

María N. Moreno García (Chairman) University of Salamanca (Spain)
Luis Alonso Romero University of Salamanca (Spain)
Angel Luis Sánchez Lázaro University of Salamanca (Spain)
Vivian López Batista University of Salamanca (Spain)
María José Polo Martín University of Salamanca (Spain)
María Dolores Muñoz Vicente University of Salamanca (Spain)
Ana Belén Gil González University of Salamanca (Spain)
Antonio Garrote Hernández University of Salamanca (Spain)
Joel P. Lucas University of Salamanca (Spain)
Maguelonne Teisseire University of Montpellier 2 (France)
Ana María Almeida Institute of Engineering of Porto (Portugal)
César Hervás University of Córdoba (Spain)
Chris Cornelis Ghent University (Belgium)
Carlos Alonso University of Valladolid (Spain)
Anne Laurent University of Montpellier 2 (France)
María José del Jesús University of Jaen (Spain)
Rafael Corchuelo University of Sevilla (Spain)
Constantino Martins Institute of Engineering of Porto (Portugal)
Yolanda Blanco University of Vigo (Spain)

Special Session on Adaptative Multi-Agent System Committee

Vicente Julian Polytechnic University of Valencia (Spain)
Alberto Fernández University of Rey Juan Carlos (Spain)
Juan M. Corchado University of Salamanca (Spain)
Vicente Botti Polytechnic University of Valencia (Spain)
Sascha Ossowski University of Rey Juan Carlos (Spain)
Sara Rodríguez González University of Salamanca (Spain)
Carlos Carrascosa Polytechnic University of Valencia (Spain)
Javier Bajo Pontifical University of Salamanca (Spain)
Martí Navarro Polytechnic University of Valencia (Spain)
Stella Heras Polytechnic University of Valencia (Spain)
Carlos A. Iglesias Technical University of Madrid (Spain)
Holger Billhardt University King Juan Carlos I
<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Javier Palanca</td>
<td>Polytechnic University of Valencia (Spain)</td>
</tr>
<tr>
<td>Juan Francisco de Paz Santana</td>
<td>University of Salamanca (Spain)</td>
</tr>
<tr>
<td>Álvaro Herrero</td>
<td>University of Burgos</td>
</tr>
<tr>
<td>Victor Sanchez</td>
<td>Polytechnic University of Valencia (Spain)</td>
</tr>
</tbody>
</table>

**Special Session on Integration of Artificial Intelligence Technologies in Resource-Constrained Devices Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juan Antonio Botía Blaya</td>
<td>University of Murcia (Spain)</td>
</tr>
<tr>
<td>Joaquin Canada-Bago</td>
<td>University of Jaen (Spain)</td>
</tr>
<tr>
<td>Jose Angel Fernandez-Prieto</td>
<td>University of Jaen (Spain)</td>
</tr>
<tr>
<td>Manuel Angel Gadeo-Martos</td>
<td>University of Jaen (Spain)</td>
</tr>
<tr>
<td>Alicia Triviño-Cabrera</td>
<td>University of Malaga (Spain)</td>
</tr>
<tr>
<td>Juan Ramon Velasco</td>
<td>University of Alcala (Spain)</td>
</tr>
</tbody>
</table>

**Special Session on Bio-Inspired and Multi-Agents Systems: Applications to Languages Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gemma Bel Enguix (Co-chairman)</td>
<td>GRLMC - Rovira i Virgili University (Spain)</td>
</tr>
<tr>
<td>Alfonso Ortega de la Puente</td>
<td>Universidad Autónoma de Madrid (Spain)</td>
</tr>
<tr>
<td>María de la Cruz Echeandía</td>
<td>Universidad Autónoma de Madrid (Spain)</td>
</tr>
<tr>
<td>(Co-chairman)</td>
<td></td>
</tr>
<tr>
<td>Alejandro Echeverría Rey</td>
<td>Universidad Autónoma de Madrid (Spain)</td>
</tr>
<tr>
<td>Peter Leupold</td>
<td>Rovira i Virgili University (Spain)</td>
</tr>
<tr>
<td>Robert Mercas</td>
<td>Rovira i Virgili University (Spain)</td>
</tr>
<tr>
<td>Diana Pérez Marín</td>
<td>Universidad Rey Juan Carlos (Spain)</td>
</tr>
<tr>
<td>Leonor Becerra-Bonache</td>
<td>Rovira i Virgili University (Spain)</td>
</tr>
<tr>
<td>Luis Fernando de Mingo López</td>
<td>Universidad Politécnica de Madrid (Spain)</td>
</tr>
</tbody>
</table>

**Special Session on Agents for Smart Mobility Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miguel Ángel Sánchez (chairman)</td>
<td>Pontifical University of Salamanca (Spain)</td>
</tr>
<tr>
<td>Montserrat Mateos</td>
<td>Pontifical University of Salamanca (Spain)</td>
</tr>
<tr>
<td>Encarnación Beato</td>
<td>Pontifical University of Salamanca (Spain)</td>
</tr>
</tbody>
</table>
Ana M. Fermoso  Pontifical University of Salamanca  (Spain)
Alberto Pedrero  Pontifical University of Salamanca  (Spain)
Vidal Alonso  Pontifical University of Salamanca  (Spain)
Roberto Berjón  Pontifical University of Salamanca  (Spain)

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

Special Session on Agents Behaviours for Artificial Markets

Calibration of an Agent Based Model for Financial Markets .................................................... 1
Annalisa Fabretti

A Multiagent System For Web-Based Risk Management in Small and Medium Business .................. 9
Juan F. De Paz, Javier Bajo, M. Lourdes Borrajo, Juan M. Corchado

Drawing Technical Figures in Double Auction Artificial Stock Markets ............................................. 19
Albert Meco, Javier Arroyo, Juan Pavón

Special Session on Multi-Agent Systems for Safety and Security

VigilAgent Methodology: Modeling Normal and Anomalous Situations ........................................... 27
José Manuel Gascueña, Elena Navarro, Antonio Fernández-Caballero

Developing Secure Agent Infrastructures with Open Standards and Open-Source Technologies ............. 37
Joan Bellver, Jose M. Such, Agustin Espinosa, Ana García-Fornes

A Fingerprint-Based Secure Communications Method ........... 45
Angélica González, Rafael García Bermejo Giner, Eladio Sanz García, Rosa María García
Special Session on Web Mining and Recommender Systems

Multiagent System for Indexing and Retrieving Learning Objects ...................................................... 53
Jonas Vian, Ricardo Azambuja Silveira

Data Mining Techniques for Web Page Classification ........ 61
Gabriel Fiol-Roig, Margaret Miró-Julià, Eduardo Herranz

Analizing Factors to Increase the Influence of a Twitter User .......................................................... 69
José del Campo-Ávila, Nathalie Moreno-Vergara,
Mónica Trella-López

Lightweight User Modeling – A Case Study ................. 77
Nuno Luz, Ricardo Anacleto, Constantino Martins, Ana Almeida

Semantic Zoom: A Details on Demand Visualisation Technique for Modelling OWL Ontologies ............. 85
Juan Garcia, Roberto Theron, Francisco García

PCMAT – Mathematics Collaborative Learning Platform .... 93
Constantino Martins, Paulo Couto, Marta Fernandes,
Cristina Bastos, Cristina Lobo, Luiz Faria, Eurico Carrapatoso

Applying Recommender Methodologies in Tourism Sector ... 101
Joel Pinho Lucas, Bruno E. da Silva Coelho,
María N. Moreno García, Ana Maria de Almeida Figueiredo,
Constantino Lopes Martins

Automatic Learning Object Extraction and Classification in Heterogeneous Environments ...................... 109
A.B. Gil, F. De la Prieta, S. Rodríguez

Special Session on Adaptative Multi-Agent System

Agents for Swarm Robotics: Architecture and Implementation ................................................................. 117
F. Aznar, M. Sempere, F.J. Mora, P. Arques, J.A. Puchol,
M. Pujol, R. Rizo

An Organizational Approach to Agent-Based Virtual Power Stations via Coalitional Games ....................... 125
Radu-Casian Mihailescu, Matteo Vasirani, Sascha Ossowski

Towards Norm Enforcer Agents ........................................ 135
N. Criado, E. Argente, V. Botti
Mixing Electronic Institutions with Virtual Organizations: A Solution Based on Bundles ................................. 143
Mario Rodrigo Solaz, Bruno Rosell i Gui, Juan A. Rodríguez-Aguilar, Vicente Julián Inglada, Carlos Carrascosa Casamayor

Open Issues in Multiagent System Reorganization ......... 151
Juan M. Alberola, Vicente Julian, Ana Garcia-Fornes

Pervasive Healthcare Using Self-Healing Agent Environments .............................................................. 159
Stefano Bromuri, Michael Ignaz Schumacher, Kostas Stathis

Supporting Dynamics Multiagent Systems on THOMAS ... 167
Alfonso Machado, Vicente Julian

Adaptive Multi Agent System for Guiding Groups of People in Urban Areas ........................................ 175
Anais Garrell, Oscar Sandoval-Torres, Alberto Sanfeliu

Agent Adaptation through Social Opinion ...................... 185
Juan A. Garcia-Pardo, C. Carrascosa

Virtual Organizations in Information Fusion .................. 195
S. Rodríguez, D. Tapia, F. De Paz, F. De la Prieta

Special Session on Integration of Artificial Intelligence Technologies in Resource-Constrained Devices

Greenhouse Indoor Temperature Prediction Based on Extreme Learning Machines for Resource-Constrained Control Devices Implementation ...................................................... 203
A. Paniagua-Tineo, S. Salcedo-Sanz, E.G. Ortiz-García, A. Portilla-Figueras, B. Saavedra-Moreno, G. López-Díaz

Propagation of Agent Performance Parameters in Wireless Sensor Networks ............................................. 213
J.C. Cuevas-Martinez, J. Canada-Bago, J.A. Fernández-Prieto, M.A. Gadeo-Martos

Distribution of a Reasoning Engine over Wireless Sensor Networks ..................................................... 223
Carmen Iniesta, Juan A. Botía, Pedro M. Ruiz
Efficient Use of Voice Activity Detector and Automatic Speech Recognition in Embedded Platforms for Natural Language Interaction ........................................ 233
Marcos Santos-Pérez, Eva González-Parada,
José Manuel Cano-García

A Fuzzy Logic-Based and Distributed Gateway Selection for Wireless Sensor Networks ........................................ 243
A. Triviño Cabrera, A.J. Yuste-Delgado, D. Cintrano Macías

HERA: Hardware-Embedded Reactive Agents Platform ..... 249
Dante I. Tapia, Ricardo S. Alonso, Óscar García, Juan M. Corchado

Special Session on Bio-Inspired and Multi-Agents Systems: Applications to Languages

A Global Ant Colony Algorithm for Word Sense Disambiguation Based on Semantic Relatedness .......... 257
Didier Schwab, Nathan Guillaume

Modeling Context Information for Computational Semantics with the Language of Acyclic Recursion ........ 265
Roussanka Loukanova

Complete Obligatory Hybrid Networks of Evolutionary Processors .............................................................. 275
Artiom Alhazov, Gemma Bel-Enguix, Alexander Krassovitskiy, Yurii Rogozhin

Agents in Formal Language Theory: An Overview .......... 283
M. Dolores Jiménez-López

Self Cross-Over Array Languages ......................... 291
A. Roslin Sagaya Mary, K.G. Subramanian

Special Session on Agents for Smart Mobility

Multi-Agent System (GerMAS) Used to Identify Medicines in Geriatric Residences ........................................ 299
Jose M. Pérez, F. Fernández, Juan A. Fraile, M. Mateos, Miguel A. Sánchez

Head Tracking System for Wheelchair Movement Control ... 307
R. Berjón, M. Mateos, A. Barriuso, I. Muriel, G. Villarrubia

Smart m-Learning Reusing Educational Contents .......... 317
Ana Mª Fermoso García, Alberto Pedrero Esteban
Mobile Assistant for the Elder (MASEL): A Practical Application of Smart Mobility ........................................ 325
M.A. Sánchez, E. Beato, D. Salvador, A. Martín

Interaction Mechanism for Language Learning for Elderly People through Mobile Devices ........................................ 333
Antonia Macarro, Emma Villafaina, Ana María Pinto, Javier Bajo

Author Index ..................................................................................................................... 341