

LNAI Series Editors

Randy Goebel

University of Alberta, Edmonton, Canada

Yuzuru Tanaka

Hokkaido University, Sapporo, Japan

Wolfgang Wahlster

DFKI and Saarland University, Saarbrücken, Germany

LNAI Founding Series Editor

Joerg Siekmann

DFKI and Saarland University, Saarbrücken, Germany

More information about this series at <http://www.springer.com/series/1244>

Marco Gavanelli · Evelina Lamma
Fabrizio Riguzzi (Eds.)

AI*IA 2015

Advances in Artificial Intelligence

XIVth International Conference
of the Italian Association for Artificial Intelligence
Ferrara, Italy, September 23–25, 2015
Proceedings

Editors

Marco Gavanelli
Dipartimento di Ingegneria
Università di Ferrara
Ferrara
Italy

Fabrizio Riguzzi
Dipartimento di Matematica e Informatica
Università di Ferrara
Ferrara
Italy

Evelina Lamma
Dipartimento di Ingegneria
Università di Ferrara
Ferrara
Italy

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Artificial Intelligence
ISBN 978-3-319-24308-5 ISBN 978-3-319-24309-2 (eBook)
DOI 10.1007/978-3-319-24309-2

Library of Congress Control Number: 2015950944

LNCS Sublibrary: SL7 – Artificial Intelligence

Springer Cham Heidelberg New York Dordrecht London

© Springer International Publishing Switzerland 2015

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, 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.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media
(www.springer.com)

Preface

This book collects the contributions accepted for *AI*IA 2015, the 14th Conference of the Italian Association for Artificial Intelligence*, held in Ferrara, Italy, September 23–25, 2015. The conference is organized by AI*IA (the Italian Association for Artificial Intelligence) and it is held every other year.

The Program Committee (PC) received 44 valid submissions. Each paper was carefully reviewed by at least three members of the PC, who selected the 35 papers that are presented in these proceedings.

Following the 2013 edition of the conference, we adopted a “social” model: the papers were made available to conference participants in advance, each paper was shortly presented at the conference and was assigned a time slot and a reserved table where the authors were available for discussing their work with the interested audience. In this way, we aim at fostering discussion and facilitating idea exchange, community creation, and collaboration.

AI*IA 2015 featured exciting keynotes by Laurent Perron, Technical Leader of the Operations Research Team at Google; Kristian Kersting, Head of the Statistical Relational Activity Mining Group, Fraunhofer IAIS, Technical University of Dortmund; Oren Etzioni, Director of the Allen Institute for Artificial Intelligence; and Kevin Warwick, Deputy Vice Chancellor (Research) at Coventry University.

The program of the conference also included six workshops: the *First Workshop on Artificial Intelligence and Design (AIDE 2015)*, the *Second Workshop on Artificial Intelligence and Robotics (AIRO 2015)*, the *Sixth Italian Workshop on Planning and Scheduling (IPS 2015)*, the *First Workshop on Intelligent Techniques at Libraries and Archives (IT@LIA 2015)*, the *Fourth Italian Workshop on Machine Learning and Data Mining (MLDM.it 2015)*, and the *22nd RCRA International Workshop on Experimental Evaluation of Algorithms for Solving Problems with Combinatorial Explosion (RCRA 2015)*, plus a doctoral consortium.

The chairs wish to thank the Program Committee members and the anonymous reviewers for their careful work in the selection of the best papers; the chairs of the workshops and of the doctoral consortium for organizing the respective events, as well as Elena Bellodi, Giuseppe Cota, Andrea Peano, and Riccardo Zese for their help during the organization of the conference.

July 2015

Marco Gavanelli
Evelina Lamma
Fabrizio Riguzzi

Organization

AI*IA 2015 was organized by AI*IA (Associazione Italiana per l'Intelligenza Artificiale), in cooperation with the Departments of Engineering and of Mathematics and Computer Science of the University of Ferrara (Italy).

Executive Committee

Conference Chairs

Marco Gavanelli	Università di Ferrara, Italy
Evelina Lamma	Università di Ferrara, Italy
Fabrizio Riguzzi	Università di Ferrara, Italy

Doctoral Consortium Chairs

Elena Bellodi	Università di Ferrara, Italy
Alessio Bonfietti	Università di Bologna, Italy

Panel Chair

Piero Poccianti	Consorzio Operativo Gruppo MPS, Italy
-----------------	---------------------------------------

Program Committee

Matteo Baldoni	Università di Torino, Italy
Stefania Bandini	Università Milano-Bicocca, Italy
Roberto Basili	Università di Roma Tor Vergata, Italy
Nicola Basilico	Università di Milano, Italy
Elena Bellodi	Università di Ferrara, Italy
Federico Bergenti	Università di Parma, Italy
Stefano Bistarelli	Università di Perugia, Italy
Luciana Bordonì	ENEA, Italy
Francesco Buccafurri	Università Mediterranea di Reggio Calabria, Italy
Stefano Cagnoni	Università di Parma, Italy
Diego Calvanese	Free University of Bozen-Bolzano, Italy
Amedeo Cappelli	CNR, Italy
Luigia Carlucci Aiello	Sapienza Università di Roma, Italy
Amedeo Cesta	CNR, Italy
Antonio Chella	Università di Palermo, Italy
Carlo Combi	Università di Verona, Italy
Gabriella Cortellessa	CNR, Italy
Stefania Costantini	Università di L'Aquila, Italy

Giuseppe De Giacomo	Sapienza Università di Roma, Italy
Francesco Donini	CNR, Italy
Agostino Dovier	Università di Udine, Italy
Floriana Esposito	Università di Bari, Italy
Stefano Ferilli	Università di Bari, Italy
Marco Gavanelli	Università di Ferrara, Italy
Nicola Guarino	CNR, Italy
Luca Iocchi	Sapienza Università di Roma, Italy
Evelina Lamma	Università di Ferrara, Italy
Nicola Leone	Università della Calabria, Italy
Chendong Li	Dell, USA
Francesca Alessandra Lisi	Università di Bari, Italy
Bernardo Magnini	FBK, Italy
Sara Manzoni	Università Milano-Bicocca, Italy
Alberto Martelli	Università di Torino, Italy
Paola Mello	Università di Bologna, Italy
Alessio Micheli	Università di Pisa, Italy
Alfredo Milani	Università di Perugia, Italy
Michela Milano	Università di Bologna, Italy
Stefania Montani	Università del Piemonte Orientale, Italy
Alessandro Moschitti	Università di Trento, Italy
Roberto Navigli	Sapienza Università di Roma, Italy
Angelo Oddi	CNR, Italy
Andrea Omicini	Università di Bologna, Italy
Maria Teresa Pazienza	Università di Roma Tor Vergata, Italy
Roberto Pirrone	Università di Palermo, Italy
Piero Poccianti	Consorzio Operativo Gruppo MPS, Italy
Gian Luca Pozzato	Università di Torino, Italy
Luca Pulina	Università di Sassari, Italy
Daniele P. Radicioni	Università di Torino, Italy
Francesco Ricca	Università della Calabria, Italy
Fabrizio Riguzzi	Università di Ferrara, Italy
Andrea Roli	Università di Bologna, Italy
Salvatore Ruggieri	Università di Pisa, Italy
Fabio Sartori	Università Milano-Bicocca, Italy
Ken Satoh	National Institute of Informatics and Sokendai, Japan
Andrea Schaerf	Università di Udine, Italy
Floriano Scioscia	Politecnico di Bari, Italy
Giovanni Semeraro	Università di Bari, Italy
Roberto Serra	Università di Modena e Reggio Emilia, Italy
Francesca Toni	Imperial College, UK
Pietro Torasso	Università di Torino, Italy
Eloisa Vargiu	Barcelona Digital Technology Center, Spain
Marco Villani	Università di Modena e Reggio Emilia, Italy
Giuseppe Vizzari	Università Milano-Bicocca, Italy

Additional Reviewers

Bacciu, Davide	De Benedictis, Riccardo	Mencar, Corrado
Barlacchi, Gianni	Degeler, Viktoriya	Patti, Viviana
Basile, Pierpaolo	Franzoni, Valentina	Poggioni, Valentina
Bellandi, Andrea	Furletti, Barbara	Portinale, Luigi
Benotto, Giulia	Fuscà, Davide	Sato, Taisuke
Bloisi, Domenico Daniele	Gallicchio, Claudio	Takahashi, Kazuko
Cauteruccio, Francesco	Georgievski, Ilche	Tesconi, Maurizio
D'Amato, Claudia	Lieto, Antonio	
Dal Palù, Alessandro	Manna, Marco	

Sponsoring Institutions

AI*IA 2015 was partially funded by the Artificial Intelligence Journal, by the Departments of Engineering and of Mathematics and Computer Science of the University of Ferrara, by the Istituto Nazionale di Alta Matematica “F. Severi” - Gruppo Nazionale per il Calcolo Scientifico, by Dario Flaccovio Editore, and by the Italian Association for Artificial Intelligence.

Contents

Swarm Intelligence and Genetic Algorithms

Collective Self-Awareness and Self-Expression for Efficient Network Exploration	3
<i>Michele Amoretti and Stefano Cagnoni</i>	
Swarm-Based Controller for Traffic Lights Management	17
<i>Federico Caselli, Alessio Bonfietti, and Michela Milano</i>	
Path Relinking for a Constrained Simulation-Optimization Team Scheduling Problem Arising in Hydroinformatics	31
<i>Maddalena Nonato and Andrea Peano</i>	
Dynamical Properties of Artificially Evolved Boolean Network Robots	45
<i>Andrea Roli, Marco Villani, Roberto Serra, Stefano Benedettini, Carlo Pinciroli, and Mauro Birattari</i>	
Adaptive Tactical Decisions in Pedestrian Simulation: A Hybrid Agent Approach	58
<i>Luca Crociani, Andrea Piazzoni, Giuseppe Vizzari, and Stefania Bandini</i>	

Computer Vision

Using Stochastic Optimization to Improve the Detection of Small Checkerboards	75
<i>Hamid Hassannejad, Guido Matrella, Monica Mordonini, and Stefano Cagnoni</i>	

Multi Agent Systems

Empowering Agent Coordination with Social Engagement	89
<i>Matteo Baldoni, Cristina Baroglio, Federico Capuzzimati, and Roberto Micalizio</i>	
Anticipatory Coordination in Socio-Technical Knowledge-Intensive Environments: Behavioural Implicit Communication in <i>MoK</i>	102
<i>Stefano Mariani and Andrea Omicini</i>	
A Kinetic Study of Opinion Dynamics in Multi-agent Systems	116
<i>Stefania Monica and Federico Bergenti</i>	

Cooperating with Trusted Parties Would Make Life Easier	128
<i>Pasquale Caianiello, Stefania Costantini, Giovanni De Gasperis, and Subhasis Thakur</i>	

Agent Based Simulation of Incentive Mechanisms on Photovoltaic Adoption.	136
<i>Valerio Iachini, Andrea Borghesi, and Michela Milano</i>	

Knowledge Representation and Reasoning

Feature-Based Modelling and Information Systems for Engineering.	151
<i>Emilio M. Sanfilippo and Stefano Borgo</i>	

A Multi-engine Theorem Prover for a Description Logic of Typicality.	164
<i>Laura Giordano, Valentina Gliozzi, Nicola Olivetti, Gian Luca Pozzato, and Luca Violanti</i>	

Advances in Multi-engine ASP Solving	179
<i>Marco Maratea, Luca Pulina, and Francesco Ricca</i>	

Defeasible Logic Programming in Satisfiability Modulo CHR.	191
<i>Francesco Santini</i>	

Abstract Solvers for Quantified Boolean Formulas and their Applications. . . .	205
<i>Remi Brochenin and Marco Maratea</i>	

Machine Learning

Learning Accurate Cutset Networks by Exploiting Decomposability	221
<i>Nicola Di Mauro, Antonio Vergari, and Floriana Esposito</i>	

Common-Sense Knowledge for Natural Language Understanding: Experiments in Unsupervised and Supervised Settings	233
<i>Luigi Di Caro, Alice Ruggeri, Loredana Cupi, and Guido Boella</i>	

An AI Application to Integrated Tourism Planning	246
<i>Francesca Alessandra Lisi and Floriana Esposito</i>	

Testing a Learn-Verify-Repair Approach for Safe Human-Robot Interaction	260
<i>Shashank Pathak, Luca Pulina, and Armando Tacchella</i>	

An Approach to Predicate Invention Based on Statistical Relational Model.	274
<i>Stefano Ferilli and Giuseppe Fatiguso</i>	

Empowered Negative Specialization in Inductive Logic Programming	288
<i>Stefano Ferilli, Andrea Pazienza, and Floriana Esposito</i>	

Semantic Web

GENOMA: GENeric Ontology Matching Architecture	303
<i>Roberto Enea, Maria Teresa Pazienza, and Andrea Turbati</i>	
Open Data Integration Using SPARQL and SPIN: A Case Study for the Tourism Domain.	316
<i>Antonino Lo Bue and Alberto Machì</i>	

Natural Language

Bootstrapping Large Scale Polarity Lexicons through Advanced Distributional Methods.	329
<i>Giuseppe Castellucci, Danilo Croce, and Roberto Basili</i>	
Using Semantic Models for Robust Natural Language Human Robot Interaction	343
<i>Emanuele Bastianelli, Danilo Croce, Roberto Basili, and Daniele Nardi</i>	
Automatic Identification and Disambiguation of Concepts and Named Entities in the Multilingual Wikipedia	357
<i>Federico Scozzafava, Alessandro Raganato, Andrea Moro, and Roberto Navigli</i>	
A Logic-Based Approach to Named-Entity Disambiguation in the Web of Data	367
<i>Silvia Giannini, Simona Colucci, Francesco M. Donini, and Eugenio Di Sciascio</i>	

Scheduling, Planning, and Robotics

Efficient Power-Aware Resource Constrained Scheduling and Execution for Planetary Rovers	383
<i>Daniel Díaz, Amedeo Cesta, Angelo Oddi, Riccardo Rasconi, and Maria Dolores Rodriguez-Moreno</i>	
Graph-Based Task Libraries for Robots: Generalization and Autocompletion	397
<i>Steven D. Klee, Guglielmo Gemignani, Daniele Nardi, and Manuela Veloso</i>	
Enriching a Temporal Planner with Resources and a Hierarchy-Based Heuristic	410
<i>Alessandro Umbrico, Andrea Orlandini, and Marta Cialdea Mayer</i>	
Integrating Logic and Constraint Reasoning in a Timeline-Based Planner. . . .	424
<i>Riccardo De Benedictis and Amedeo Cesta</i>	

ASCoL: A Tool for Improving Automatic Planning Domain Model Acquisition. 438
 Rabia Jilani, Andrew Crampton, Diane Kitchin, and Mauro Vallati

Approaching Qualitative Spatial Reasoning About Distances and Directions in Robotics. 452
 Guglielmo Gemignani, Roberto Capobianco, and Daniele Nardi

COACHES Cooperative Autonomous Robots in Complex and Human Populated Environments. 465
 Luca Iocchi, M.T. Lázaro, Laurent Jeanpierre, Abdel-illah Mouaddib, Esra Erdem, and Hichem Sahli

Author Index 479