

Lecture Notes in Artificial Intelligence 2829

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Amedeo Cappelletti Franco Turini (Eds.)

AI*IA 2003: Advances in Artificial Intelligence

8th Congress of the
Italian Association for Artificial Intelligence
Pisa, Italy, September 23-26, 2003
Proceedings



Springer

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Amedeo Cappelletti
ISTI CNR, Area della Ricerca
Via G. Moruzzi 1, 56124 Pisa, Italy
E-mail: amedeo.cappelletti@isti.cnr.it

Franco Turini
Università degli Studi di Pisa, Dipartimento di Informatica
Via F. Buonarroti 2, 56127 Pisa, Italy
E-mail: turini@di.unipi.it

Cataloging-in-Publication Data applied for

A catalog record for this book is available from the Library of Congress

Bibliographic information published by Die Deutsche Bibliothek
Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliographie;
detailed bibliographic data is available in the Internet at <<http://dnd.ddb.de>>.

CR Subject Classification (1998): I.2, F.1, F.4.1

ISSN 0302-9743

ISBN 3-540-20119-X Springer-Verlag Berlin Heidelberg New York

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, re-use of illustrations, recitation, broadcasting, reproduction on microfilms 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-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York,
a member of BertelsmannSpringer Science+Business Media GmbH

<http://www.springer.de>

© Springer-Verlag Berlin Heidelberg 2003
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Da-TeX Gerd Blumenstein
Printed on acid-free paper SPIN: 10956106 06/3142 5 4 3 2 1 0

Preface

This volume contains the proceedings of the 8th AI*IA conference, held in Pisa on September 23-26, 2003. This conference is the traditional biennial event of the Italian Association for Artificial Intelligence and follows those held in Trento (1989), Palermo (1991), Turin (1993), Florence (1995), Rome (1997), Bologna (1999), and Bari (2001).

The congress included invited speaker seminars, scientific paper talks, system demonstrations, tutorials, panels, and workshops on specific topics both on methods and on innovative applications of artificial intelligence.

The program committee selected 44 contributions among the 91 submitted, which cover the following topics: machine learning, neural networks, planning and control, automatic reasoning, distributed artificial intelligence, knowledge representation, knowledge discovery and data mining, natural language Processing.

The scientific program also included two invited lectures by Paolo Dario and Bob Moore, and four workshops, coordinated by Maria Simi:

Ambient Intelligence (chaired by Paolo Remagnino and GianLuca Foresti) discussed techniques for the development of intelligent environments for a wide range of application domains, including health, managed public environments, and practice skills training.

Artificial Intelligence for Cultural Heritage (chaired by Luciana Bordini) analyzed the contribution of artificial intelligence and other innovative technologies to the emergent sector of cultural heritage and aimed to promote greater cooperation between scholars working in different sectors.

Artificial Intelligence and E-Learning (chaired by Giovanni Adorni) covered current research in the development of improved e-learning methodologies and platforms, e.g. the role of learning objects-related standards with respect to semantic-Web, agent-based frameworks and so on.

Topics and Perspective of Natural Language Processing in Italy (chaired by Nicoletta Calzolari and Bernardo Magnini) presented the state of the art of NLP in Italy and discussed, in particular, the results and the limits of human language technologies in Italy with respect to current international directions.

Two Panels on “Advanced Information Technologies in Medicine”, chaired by Antonina Starita and “Artificial Intelligence and Technology Transfer” chaired by Cinzia Giachetti, successfully contributed to promoting greater awareness of the mature state of artificial intelligence. Four tutorials, coordinated by Paolo Mancarella, presented relevant and original topics: “Norms and Institutions”, by Marek Sergot, “Machine Learning for Automated Text Classification”, by

Fabrizio Sebastiani, “An Introduction to Logic-Based Multi-agent Systems”, by Paolo Torroni, and “Fusion of Multiple Patterns Classifiers”, by Fabio Roli.

We would like to thank all the aforementioned persons, and we are confident that, with their help, the 2003 meeting strengthened awareness that artificial intelligence is assuming a central role in the present development of science and technology.

We also thank all the members of the program committee and all the referees for their care in reviewing and selecting the submitted papers. We also express our gratitude to all members of the local organizing committee, for their help in organizing this event.

Special thanks to Salvatore Ruggieri, reference point for all persons involved in the organization, *maître à faire* of the *scienza machinale*, and true *deus ex machina* when solutions were needed for the ever emerging problems in the organization of a congress.

July 2003

Amedeo Cappelletti, Franco Turini

Organization

Program Chairs

Amedeo Cappelli, Istituto di Scienza e Tecnologie dell'Informazione, CNR, Pisa
Franco Turini, Dipartimento di Informatica, Università di Pisa

Program Committee

Giuseppe Attardi (Univ. Pisa)
Andrea Bonarini (Politecnico Milano)
Luciana Bordonì (ENEA Roma)
Ernesto Burattini (Univ. Napoli)
Luigia Carlucci Aiello (Univ. Roma La Sapienza, IRST Trento)
Cristiano Castelfranchi (Univ. Siena, CNR Roma)
Floriana Esposito (Univ. Bari)
Salvatore Gaglio (Univ. Palermo)
Fosca Giannotti (CNR Pisa)
Attilio Giordana (Univ. Piemonte Orientale)
Enrico Giunchiglia (Univ. Genova)
Fausto Giunchiglia (Univ. Trento)
Marco Gori (Univ. Siena)
Nicola Guarino (CNR Trento)
Maurizio Lenzerini (Univ. Roma La Sapienza)
Leonardo Lesmo (Univ. Torino)
Paola Mello (Univ. Bologna)
Alfonso Milani (Univ. Perugia)
Maria Teresa Pazienza (Univ. Roma Tor Vergata)
Agostino Poggi (Univ. Parma)
Roberto Serra (Centro Ricerche Ambientali Montecatini, Ravenna)
Giovanni Soda (Univ. Firenze)
Oliviero Stock (IRST Trento)
Furio Suggi Liverani (Illy Caffè, Trieste)
Piero Torasso (Univ. Torino)

Tutorial Chair

Paolo Mancarella (Univ. Pisa)

Workshop Chair

Maria Simi (Univ. Pisa)

Organizing Committee

Salvatore Ruggieri, coordinator (Univ. Pisa)
 Miriam Baglioni (Univ. Pisa)
 Dario Besseghini (Univ. Pisa)
 Andrea Bracciali (Univ. Pisa)
 Maria Novella Catarsi (CNR Pisa)
 Alessio Micheli (Univ. Pisa)
 Mirco Nanni (CNR Pisa)
 Chiara Renso (CNR Pisa)

Referees

Alberti M.	Cossentino M.	Mancarella P.
Andretta M.	Cesta A.	Manco G.
Appice A.	Costa F.	Marsili Libelli S.
Ardizzone E.	Damiano R.	Martelli A.
Atzori M.	Degemmis M.	Menchetti S.
Baldassarre G.	De Giacomo G.	Meo R.
Baglioni M.	Di Gregorio S.	Milano M.
Balla Drita R.	Di Mauro N.	Montemagni S.
Bandini S.	Esposito R.	Moretti L.
Basile T.	Fanizzi N.	Nanni M.
Berardi D.	Ferilli S.	Oddi A.
Berardi M.	Frasconi P.	Oltramari A.
Bertoli P.	Fratini S.	Palmerini P.
Bianchini M.	Gambino O.	Pareschi R.
Blanzieri E.	Gangemi A.	Passerini A.
Boella G.	Gavanelli M.	Pecora F.
Borgo S.	Gerevini A.	Pedreschi D.
Botta M.	Giorgini P.	Perego R.
Bracciali A.	Giovannetti E.	Pezzulo G.
Bresciani P.	Infantino I.	Pianta E.
Brogi A.	Iocchi L.	Pirrelli V.
Brunelli R.	La Cascia M.	Pirrone R.
Cagnoni S.	Lamma E.	Policella N.
Calvanese D.	Lavagetto F.	Prevete P.
Calvi G.	Lenci A.	Raffaeta` A.
Casadio R.	Licchelli O.	Reggiani M.
Catanzariti E.	Lisi F.A..	Renso C.
Ceci M.	Lombardo V.	Riguzzi F.
Ceroni A.	Lops P.	Rizzo R.
Cettolo M.	Lorini E.	Roli A.
Concilio G.	Malerba D.	Roveri M.
Cosi P.	Mana N.	Ruggieri S.

Samaritani F.
Sarti L.
Scarselli F.
Schaerf A.
Semeraro G.
Serina I.
Sorbello R.

Stellato A.
Storari S.
Straccia U.
Susi A.
Tagliaferri R.
Terenziani P.
Tonetta S.

Torroni P.
Torta G.
Traverso P.
Trentin E.
Zancanaro M.
Zanzotto F.M.
Zini F.

Table of Contents

Knowledge Representation and Reasoning

A Complete Subsumption Algorithm

*Stefano Ferilli, Nicola Di Mauro, Teresa M.A. Basile,
and Floriana Esposito*

1

Temporal Decision Trees for Diagnosis: An Extension

Claudia Picardi

14

Obligations as Social Constructs

Guido Boella and Leendert van der Torre

27

Automatically Decomposing Configuration Problems

Luca Anselma, Diego Magro, and Pietro Torasso

39

Bridging the Gap between Horn Clausal Logic and Description Logics in Inductive Learning

Francesca A. Lisi and Donato Malerba

53

A Methodology for the Induction of Ontological Knowledge from Semantic Annotations

*Nicola Fanizzi, Floriana Esposito, Stefano Ferilli,
and Giovanni Semeraro*

65

Qualitative Spatial Reasoning in a Logical Framework

Alessandra Raffaetà, Chiara Renso, and Franco Turini

78

On Managing Temporal Information for Handling Durative Actions in LPG

Alfonso Gerevini, Alessandro Saetti, and Ivan Serina

91

An Abductive Proof Procedure Handling Active Rules

Paolo Mancarella and Giacomo Terreni

105

Soft Computing

BackPropagation through Cyclic Structures

M. Bianchini, M. Gori, L. Sarti, and F. Scarselli

118

A Neural Architecture for Segmentation and Modelling of Range Data

Roberto Pirrone and Antonio Chella

130

A Combination of Support Vector Machines and Bidirectional Recurrent Neural Networks for Protein Secondary Structure Prediction

Alessio Ceroni, Paolo Frasconi, Andrea Passerini, and Alessandro Vullo ..

142

Adaptive Allocation of Data-Objects in the Web Using Neural Networks <i>Joaquín Pérez O., Rodolfo A. Pazos R., Hector J. Fraire H., Laura Cruz R., and Johnatan E. Pecero S.</i>	154
---	-----

Machine Learning

Improving the SLA Algorithm Using Association Rules <i>Evelina Lamma, Fabrizio Riguzzi, Andrea Stambazzi, and Sergio Storari</i> ..	165
Incremental Induction of Rules for Document Image Understanding <i>Stefano Ferilli, Nicola Di Mauro, Teresa M.A. Basile, and Floriana Esposito</i>	176
Explaining Bagging with Monte Carlo Theory <i>Roberto Esposito and Lorenza Saitta</i>	189
Pairwise Data Clustering Using Monotone Game Dynamics <i>Massimiliano Pavan and Marcello Pelillo</i>	201
Abduction in Classification Tasks <i>Maurizio Atzori, Paolo Mancarella, and Franco Turini</i>	213

Data Mining

MQL: An Algebraic Query Language for Knowledge Discovery <i>Miriam Baglioni and Franco Turini</i>	225
Preprocessing and Mining Web Log Data for Web Personalization <i>M. Baglioni, U. Ferrara, A. Romei, S. Ruggieri, and F. Turini</i>	237
Multi-relational Structural Bayesian Classifier <i>Michelangelo Ceci, Annalisa Appice, Donato Malerba, and Vincenzo Colonna</i>	250

Intelligent Agents

Specifying and Verifying Systems of Communicating Agents in a Temporal Action Logic <i>Laura Giordano, Alberto Martelli, and Camilla Schwind</i>	262
Combining Intelligent Agents and Animation <i>Adam Szarowicz and Peter Forte</i>	275
An Abductive Interpretation for Open Agent Societies <i>M. Alberti, M. Gavanelli, E. Lamma, P. Mello, and P. Torroni</i>	287

Reasoning about Conversation Protocols in a Logic-Based Agent Language <i>Matteo Baldoni, Cristina Baroglio, Alberto Martelli, and Viviana Patti ...</i>	300
--	-----

Distributed Intelligent Management of Active Networks <i>G. Di Fatta, S. Gaglio, G. Lo Presti, G. Lo Re, and I. Selvaggio</i>	312
--	-----

Planning

Planning under Uncertainty in Linear Time Logic <i>Marta Cialdea Mayer, Carla Limongelli, Andrea Orlandini, and Valentina Poggioni</i>	324
---	-----

Planning with Fuzzy Resources <i>Marco Baiocchi, Alfredo Milani, and Valentina Poggioni</i>	336
--	-----

Planning by Abstraction Using HW[] <i>Giuliano Armano, Giancarlo Cherchi, and Eloisa Vargiu</i>	349
--	-----

The Role of Different Solvers in Planning and Scheduling Integration <i>Federico Pecora and Amedeo Cesta</i>	362
---	-----

Robotics

Evolving the Neural Controller for a Robotic Arm Able to Grasp Objects on the Basis of Tactile Sensors <i>Raffaele Bianco and Stefano Nolfi</i>	375
---	-----

An Early Cognitive Approach to Visual Motion Analysis <i>Silvio P. Sabatini and Fabio Solari</i>	385
---	-----

Content Based Image Retrieval for Unsegmented Images <i>Marco Anelli, Alessandro Micarelli, and Enver Sangineto</i>	398
--	-----

A Mechanism of Coalition Formation in the Metaphor of Politics Multiagent Architecture <i>Antonio Chella, Rosario Sorbello, Daniele Ribaudo, Ignazio V. Finazzo, and Leonardo Papuzzo</i>	410
---	-----

Image-Based Monte-Carlo Localisation without a Map <i>Emanuele Menegatti, Mauro Zoccarato, Enrico Pagello, and Hiroshi Ishiguro</i>	423
--	-----

Natural Language Processing

Making Explicit the Hidden Semantics of Hierarchical Classifications <i>Bernardo Magnini, Luciano Serafini, and Manuela Speranza</i>	436
Sub-symbolic Encoding of Words <i>Giorgio Vassallo, Giovanni Pilato, Andrea Maggio, Alessandro Puglisi, and Salvatore Gaglio</i>	449
A Relation-Based Schema for Treebank Annotation <i>Cristina Bosco and Vincenzo Lombardo</i>	462

Applications

Personalized Recommendation of TV Programs <i>L. Ardissono, C. Gena, P. Torasso, F. Bellifemine, A. Chiarotto, A. Difino, and B. Negro</i>	474
A Simulation-Based Decision Support System for Forest Fire Fighting <i>Sung-Do Chi, Ye-Hwan Lim, Jong-Keun Lee, Jang-Se Lee, Soo-Chan Hwang, and Byung-Heum Song</i>	487
Knowledge Maintenance and Sharing in the KM Context: The Case of P-Truck <i>Stefania Bandini, Sara Manzoni, and Fabio Sartori</i>	499
A CSP-Based Interactive Decision Aid for Space Mission Planning <i>Amedeo Cesta, Gabriella Cortellessa, Angelo Oddi, and Nicola Policella</i> ...	511
E-mail Categorization, Filtering, and Alerting on Mobile Devices: The ifMail Prototype and its Experimental Evaluation <i>Marco Cignini, Stefano Mizzaro, and Carlo Tasso</i>	523
Applying Artificial Intelligence to Clinical Guidelines: The GLARE Approach <i>Paolo Terenziani, Stefania Montani, Alessio Bottrighi, Mauro Torchio, Gianpaolo Molino, Luca Anselma, and Gianluca Correndo</i>	536

Invited Speakers

Two Paradigms for Natural-Language Processing <i>Robert C. Moore</i>	548
Robotics and AI: From Intelligent Robots to Neuro-robotics <i>Paolo Dario</i>	549
Author Index	551