

Lecture Notes in Artificial Intelligence 1321

Subseries of Lecture Notes in Computer Science

Edited by J. G. Carbonell and J. Siekmann

Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

Maurizio Lenzerini (Ed.)

AI*IA 97: Advances in Artificial Intelligence

5th Congress of the Italian Association
for Artificial Intelligence
Rome, Italy, September 17-19, 1997
Proceedings



Springer

Series Editors

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

Volume Editor

Maurizio Lenzerini
Università degli Studi di Roma "La Sapienza"
Dipartimento di Informatica e Sistemistica
Via Salaria 113, I-00198 Roma, Italy
E-mail: lenzerini@dis.uniroma1.it

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Advances in artificial intelligence : Rome, Italy, September 17 - 19, 1997 ; proceedings / Maurizio Lenzerini (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong ; London ; Milan ; Paris ; Santa Clara ; Singapore ; Tokyo : Springer, 1997
(... congress of the Italian Association for Artificial Intelligence, AIIA ... ; 5)
(Lecture notes in computer science ; Vol. 1321 : Lecture notes in artificial intelligence)
ISBN 3-540-63576-9

CR Subject Classification (1991): I.2

ISBN 3-540-63576-9 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 1997
Printed in Germany

Typesetting: Camera ready by author
SPIN 10545769 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Preface

This book contains 37 scientific papers and 8 system description papers accepted for presentation at the Fifth Congress of the Italian Association for Artificial Intelligence (AI*IA). The Congress of the AI*IA is the most relevant Italian event in the field of Artificial Intelligence, and has been receiving much attention from many researchers and practitioners of different countries. The fifth congress, this year, is held in Rome, and is organized into 11 scientific sessions and one demo session.

The papers report on significant work carried out in the different areas of artificial intelligence, not only in Italy, but also in other countries both inside and outside Europe. Areas such as automated reasoning, knowledge representation, and planning continue to be thoroughly investigated. The collection also shows a growing interest in the fields of distributed artificial intelligence, perception, vision and robotics. The scientific papers on machine learning and natural language reflect a strong interest on these subjects, also confirmed by the large variety of approaches addressed by the various research groups. Finally, the Demo session reports on the work done on several prototype system, covering various important and interesting application domains.

In addition to the contributed papers collected in this book, the program of AI*IA 97 includes invited talks and tutorials covering advanced topics. The invited speakers are Georg Gottlob from the Technical University of Vienna (Austria), and Nicola Muscettola from the NASA AMES Research Center (USA), giving talks on "Complexity in artificial intelligence and knowledge representation," and "Automatic on-board planning for autonomous spacecraft," respectively.

Moreover, two workshops are scheduled with the purpose of illustrating significant applications in the field of artificial intelligence. The first one deals with the use of artificial intelligence in financial institutions, while the second one is devoted to an analysis of artificial intelligence techniques for improving the quality of public services for citizens. These workshops have mainly been conceived for potential users of artificial intelligence technologies so as to stimulate active interactions with them, and useful feedback to theoretical investigations.

Many people contributed in different ways to the success of the congress. First of all, the members of the program committee who efficiently handled the reviewing of the 88 submitted papers. They provided three reviews for each manuscript, by relying on the support of valuable additional reviewers. The members of the organizing committee, namely, Amedeo Cesta, Daniela D'Aloisi, Carlo Ficini, and Marco Schaerf, worked hardy for supporting all typical problems related to local arrangements. I thank them all very much for their support. In particular, I would like to thank Marco Schaerf, who chaired the organizing committee, and shared with me all the problems related to the arrangement of the various events. Without him, the congress would not have taken place.

I wish to thank Giovanni Soda, who chaired the past edition of the congress, and provided me with constant help in several aspects of the organization. Also, I am very grateful to Marco Cadoli and Andrea Schaerf, who were not formally

involved in the organization, but provided valuable support especially in the organization of the tutorials and in the preparation of the proceedings.

The financial support by Consiglio Nazionale delle Ricerche (Comitato Scienze d'Ingegneria e Architettura, e Comitato Scienze e Tecnologia dell'Informazione) for partially covering the publication cost of this book, is acknowledged.

This book is dedicated to Domenico Catarci, who died a few days before the program committe meeting of the congress. Domenico Catarci was the father of my wife, and, above all, was one of the persons that I loved most in my life.

Rome, July 1997

Maurizio Lenzerini, AI*IA 97 Program Chair

Program Chair

Maurizio LENZERINI (Università di Roma “La Sapienza”)

Program Committee

Francesco BERGADANO (Università di Torino)

Sonia BERGAMASCHI (Università di Modena)

Cristiano CASTELFRANCHI (CNR, Roma)

Amedeo CESTA (CNR, Roma)

Marco COLOMBETTI (Politecnico di Milano)

Luca CONSOLE (Università di Torino)

Francesco M. DONINI (Università di Roma “La Sapienza”)

Floriana ESPOSITO (Università di Bari)

Salvatore GAGLIO (Università di Palermo)

Massimo GALLANTI (CISE, Milano)

Nicola GUARINO (CNR, Padova)

Leonardo LESMO (Univeristà di Torino)

Giannetto LEVIZZARI (Centro Ricerche FIAT, Orbassano, Torino)

Giancarlo MAURI (Università di Milano)

Daniele NARDI (Università di Roma “La Sapienza”)

Roberto SERRA (Montecatini S.p.a., Ravenna)

Maria SIMI (Università di Pisa)

Giovanni SODA (Università di Firenze)

Oliviero STOCK (IRST, Trento)

Furio SUGGI LIVERANI (Illy Caffè, Trieste)

Carlo TASSO (Università di Udine)

Renato ZACCARIA (Università di Genova)

Organizing Committee

Marco SCHAEFER (Università di Roma “La Sapienza”) - Chair

Amedeo CESTA (CNR, Roma)

Daniela D’ALOISI (Fondazione Ugo Bordoni, Roma)

Carlo FICINI (Finmeccanica, Roma)

Referees

Amati G.	Fabre E.	Miceli M.
Andretta M.	Falco R.	Nardi D.
Ardissono L.	Falcone R.	Not E.
Ardizzone E.	Fanelli A. M.	
Artale A.	Finesso L.	Oddi A.
Attardi G.	Frasconi P.	
Avesani P.		Perini A.
Bandini S.	Gini G.	Piaggio M.
Bergamaschi S.	Giordanino M.	Portinale L.
Bertossi A.	Giordano L.	
Boella G.	Gori M.	Ricci F.
Bonarini A.	Grasso C.	Rizzi S.
Bonatti P.	Gunetti D.	Rosati R.
Borgo S.	Iocchi L.	Ruffo G.
Caglioti V.	Lamma E.	Sanseverino M.
Calvanese D.	Lanzi P. L.	Schaerf A.
Campadelli P.	Lavelli A.	Sebastiani F.
Cancedda N.	Liberatore P.	Semeraro G.
Caponetti L.	Lo Faso U.	Serafini L.
Cascio F.	Lodi S.	Sestero D.
Cesa Bianchi N.	Lombardi A.	Straccia U.
Cesta A.	Lombardo V.	Strapparava C.
Chella A.	Macaluso A.	Tanca L.
Cialdea Mayer M.	Malerba D.	Tarditi R.
Compatangelo E.	Mancarella P.	Terenziani P.
Cristani M.	Masini A.	Trainito G.
D'Aloisi D.	Masolo C.	Vercelli G.
Dabbene D.	Massacci F.	
De Giacomo G.	Matteuzzi M.	Zancanaro M.

Table of Contents

Machine Learning 1

Modeling Conceptual Change: An Interdisciplinary Approach	1
<i>F. Neri, L. Saitta (Università di Torino), A. Tiberghien (CNRS, France)</i>	
Refining Numerical Terms in Horn Clauses	13
<i>M. Botta, A. Giordana, R. Piola (Università di Torino)</i>	
Handling Continuos Data in Top-Down Induction of First-Order Rules....	24
<i>D. Malerba, F. Esposito, G. Semeraro, S. Caggese (Università di Bari)</i>	
Inductive Inference of Tree Automata by Recursive Neural Networks	36
<i>P. Frasconi (Università di Firenze), M. Gori, M. Maggini,</i>	
<i>E. Martinelli, (Università di Siena), G. Soda (Università di Firenze)</i>	

Natural Language 1

A Computational Model of Misunderstandings in Agent Communication ..	48
<i>L. Ardissono, G. Boella, R. Damiano (Università di Torino)</i>	
Wide-Coverage Lexicalized Grammars	60
<i>G. Barbero, V. Lombardo (Università di Torino)</i>	
Flexible Response Choice Using Problem-Solving Plans and Rethorical Relations	72
<i>P. Barboni, D. Sestero (Università di Torino)</i>	
A Variant of Earley Parsing	84
<i>M.-J. Nederhof (University of Groningen, The Netherlands),</i>	
<i>G. Satta (Università di Padova)</i>	

Perception, Vision and Robotics

Autonomous Robot Navigation Using a Reactive Agent	96
<i>M. Piaggio, A. Sgorbissa, (Università di Genova),</i>	
<i>G. Vercelli (Università di Trieste), R. Zaccaria (Università di Genova)</i>	
A Hybrid Architecture for Autonomous Agents	106
<i>A. Chella, S. Gaglio, G. Sajeva, F. Torterolo (Università di Palermo)</i>	
3-D Facets Construction for Stereovision	116
<i>E. Zagrouba (University of Monastir, Tunisia)</i>	
Extraction of Discriminant Features from Image Fractal Encoding.....	127
<i>M. Baldoni, C. Baroglio, D. Cavagnino,</i>	
<i>G. Lo Bello (Università di Torino)</i>	

Machine Learning 2

Learning Relational Concepts at Different Levels of Granularity	139
<i>G. Armano, G. Fumera (Università di Cagliari)</i>	
Inferring Minimal Rule Covers from Relations	147
<i>C. Carpineto, G. Romano (Fondazione Ugo Bordoni, Roma)</i>	

Corpus-Driven Unsupervised Learning of Verb Subcategorization Frames ..	159
<i>R. Basili, M. T. Pazienza, M. Vindigni (Università di Roma Tor Vergata)</i>	
Learning the Syntax and Semantic Rules of an ECG Grammar	171
<i>G. Kókai, J. Csirik (József Attila University, Hungary), T. Gyimóthy (Hungarian Academy of Sciences, Hungary)</i>	
Automated Reasoning	
Introducing Abduction into (Extensional) Inductive Logic Programming Systems	183
<i>E. Lamma (Università di Bologna), P. Mello (Università di Ferrara), M. Milano, F. Riguzzi (Università di Bologna)</i>	
An Efficient Algorithm for Temporal Abduction	195
<i>V. Brusoni, L. Console, P. Terenziani, D. Theseider Dupré (Università di Torino)</i>	
Experimental Analysis of the Computational Cost of Evaluating Quantified Boolean Formulae	207
<i>M. Cadoli, A. Giovanardi, M. Schaerf (Università di Roma "La Sapienza")</i>	
A Proof Theory for Tractable Approximations of Propositional Reasoning.....	219
<i>F. Massacci (Università di Roma "La Sapienza")</i>	
Knowledge Representation 1	
Embedding Minimal Knowledge into Autoepistemic Logic	231
<i>R. Rosati (Università di Roma "La Sapienza")</i>	
User Model-Based Information Filtering	242
<i>F.A. Asnicar, M. Di Fant, C. Tasso (Università di Udine)</i>	
A Comparative Analysis of Horn Models and Bayesian Networks for Diagnosis	254
<i>L. Portinale, P. Torasso (Università di Torino)</i>	
Distributed Artificial Intelligence	
Multi-agent Negotiation and Planning Through Knowledge Contextualization	266
<i>E. Sangineto (Università di Roma "La Sapienza")</i>	
From Task Delegation to Role Delegation	278
<i>C. Castelfranchi, R. Falcone (CNR, Roma)</i>	
Automated Reasoning On-Board Autonomous Spacecrafts.....	290
<i>N.D. Monekosso (University of Surrey, UK), P. Remagnino (The University of Reading, UK)</i>	
Planning	
A Weakly Backjumping Strategy to Solve Hard Scheduling Problems ..	302
<i>A. Oddi (CNR, Roma)</i>	

Compiling Task Networks into Partial Order Planning Domains	311
<i>M. Baioletti, S. Marcugini, A. Milani (Università di Perugia)</i>	
Natural Language 2	
A Hybrid Approach to Hypertext Generation	322
<i>N. Cancedda (Università di Roma "La Sapienza"), G. Kamstrup, E. Pianta (IRST, Trento), E. Pietrosanti (Finsiel, Roma)</i>	
Generating User-Adapted Hypermedia from Discourse Plans	334
<i>B. De Carolis, F. De Rosis, S. Pizzutillo (Università di Bari)</i>	
WordNet for Italian and Its Use for Lexical Discrimination	346
<i>A. Artale, B. Magnini, C. Strapparava (IRST, Trento)</i>	
Knowledge Representation 2	
Efficient Support for Reactive Rules in Prolog	357
<i>M. Gaspari (Università di Bologna)</i>	
Reasoning with Behavioural Knowledge in Application Domain Models	369
<i>E. Compatangelo (Università di Ancona), F.M. Donini (Università di Roma "La Sapienza"), G. Rumolo (Università di Roma TRE)</i>	
How to Solve Qualification and Ramification Using Dijkstra's Semantics for Programming Languages	381
<i>E. Madalińska-Bugaj (Warsaw University, Poland)</i>	
Towards a Qualitative Representation of Linguistic Negation of Nuanced Properties	393
<i>D. Pacholczyk (Université d'Angers, France)</i>	
Machine Learning 3	
CBET: A Case Base Exploration Tool	405
<i>P. Avesani, A. Perini, F. Ricci (IRST, Trento)</i>	
Learning Feature Weights for CBR: Global versus Local	417
<i>A. Bonzano, P. Cunningham (Trinity College Dublin, Ireland), B. Smyth (University College Dublin, Ireland)</i>	
Demos	
CompAss: a System for Plans of Study Compilation	427
<i>G. Attardi, A. Cisternino, M. Simi (Università di Pisa)</i>	
A Prototypal System for Data-Validation	431
<i>A. Balderi (ENEL, Pisa), M. Solimano (Orsi Automazione, Genova)</i>	
ODB-Tools: a Description Logics Based Tool for Schema Validation and Semantic Query Optimization in Object Oriented Databases	435
<i>S. Bergamaschi (Università di Modena), C. Sartori (Università di Bologna), D. Beneventano, M. Vincini (Università di Modena)</i>	
Processing Paper Documents with WISDOM	439
<i>D. Malerba, F. Esposito, G. Semeraro, L. De Filippis (Università di Bari)</i>	

REGAL3.2: FOL Concept Learning by Cooperative Genetic Algorithms ..	443
<i>F. Neri (Università di Torino)</i>	
IDL: A Prototypical Intelligent Digital Library Service	447
<i>G. Semeraro, F. Esposito, D. Malerba, N. Fanizzi, S. Ferilli, P. Lops (Università di Bari)</i>	
An Object-Oriented Architecture for the DRS Scheduling Problem	451
<i>P. Bazzica, G. Casonato (Università di Roma "La Sapienza"), A. Cesta (CNR, Roma)</i>	
MASMA: A Personal Assistant for Meetings Management	455
<i>R. Brancaleoni (Fondazione Ugo Bordoni), A. Cesta (CNR, Roma), D. D'Aloisi (Fondazione Ugo Bordoni)</i>	
Author Index	459