Lecture Notes in Artificial Intelligence

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

Springer Berlin

Berun Heidelberg New York Barcelona Hong Kong London Milan Paris Tokyo Matthias Jarke Jana Koehler Gerhard Lakemeyer (Eds.)

KI 2002: Advances in Artificial Intelligence

25th Annual German Conference on AI, KI 2002 Aachen, Germany, September 16-20, 2002 Proceedings



Series Editors

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

Volume Editors

Matthias Jarke Gerhard Lakemeyer RWTH Aachen, Informatik V Ahornstraße 55, 52056 Aachen, Germany E-mail: {jarke, lakemeyer}@cs.rwth-aachen.de Jana Koehler IBM Research Laboratory, Computer Science Research Säumerstraße 4, 8803 Rüschlikon, Switzerland E-mail: koe@zurich.ibm.com

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Advances in artificial intelligence : proceedings / KI 2002, 25th Annual German Conference on AI, KI 2002, Aachen, Germany, September 16 - 20, 2002. Matthias Jarke ... (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Tokyo : Springer, 2002 (Lecture notes in computer science ; 2479 : Lecture notes in artificial intelligence) ISBN 3-540-44185-9

CR Subject Classification (1998): I.2

ISSN 0302-9743 ISBN 3-540-44185-9 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 New York, a member of BertelsmannSpringer Science+Business Media GmbH

http://www.springer.de

© Springer-Verlag Berlin Heidelberg 2002 Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Stefan Sossna e.K. Printed on acid-free paper SPIN: 10871403 06/3142 5 4 3 2 1 0

Preface

This year marks the 25th anniversary of the Annual German Conference on Artificial Intelligence. When starting in 1975 as the German Workshop on AI (GWAI) in Bonn, the meetings were primarily intended as a forum for the German AI community and thus, over the years, also reflected the development of AI research in Germany. Right from the beginning, the goal of the meetings has been to bring together AI researchers working in academia and industry to share their research results and interests in the field of artificial intelligence. In 1993, the name of the meeting changed to its current form Annual German Conference on Artificial Intelligence, or KI for short. Since KI-94 in Saarbrücken presentations have been in English and the proceedings have been published in the Springer LNAI Series. With that the meeting has become a truly international event, and still is in 2002.

This volume contains the proceedings of the 25th Annual German Conference on Artificial Intelligence. For the technical program we had 58 submissions from 17 countries and from all continents except Australia. Out of these contributions slightly less than 30% (20 papers in total) were selected for presentation at the conference and for inclusion in the proceedings.

The contributions in this volume reflect the richness and diversity of artificial intelligence research. They cover important areas such as multi-agent systems, machine learning, natural language processing, constraint reasoning, knowledge representation, planning, and temporal reasoning. The paper

"On the problem of computing small representations of least common subsumers" by Franz Baader and Anni-Yasmin Turhan (Dresden University of Technology)

stood out for its exceptional quality and the program committee selected it for the Springer Best Paper Award. Congratulations to the authors for their excellent contribution.

In addition to the technical papers, this volume contains the abstracts of the three invited presentations of the conference:

- Elisabeth André (University of Augsburg): From Simulated Dialogues to Interactive Performances with Virtual Actors.
- Michael Wooldridge (University of Liverpool): Time, Knowledge, and Cooperation: Alternating-Time Temporal Epistemic Logic and Its Applications.
- Dieter Fensel (Vrije Universiteit Amsterdam): Semantic Web Enabled Web Services.

Lastly, the volume features summaries of the three DFG Priority Programs on agent technology, also presented at the conference. These, together with their respective speakers, are:

- Thomas Malsch (Hamburg-Harburg University of Technology): Socionics
- Stefan Kirn (Ilmenau University of Technology): Intelligent Agents and Realistic Commercial Application Scenarios
- Thomas Christaller (Fraunhofer AIS): Cooperating Teams of Mobile Robots in Dynamic Environments

A large number of people were involved in making this conference a success. As for the technical program, we thank all those authors who submitted papers to the conference and provided the basis from which we could select a high-quality technical program. The members of the program committee and the additional reviewers helped us in this process by providing timely, qualified reviews and participating in the discussion during the paper selection process. Many thanks to all of you!

We are very grateful to Gerhard Weiss, who served as the Workshop Chair, and Andreas Becks, who served as the Local Arrangements Chair. The Organizing Committee Members took care of the many important details that are needed to make a conference work and that require so much effort and time. Besides Andreas Becks we thank Frank Dylla, Alexander Ferrein, Günter Gans, and Irene Wicke. Günter Gans deserves a special mention for wrestling with the *ConfMan* system and for formatting this volume. We hope you will enjoy its contents!

July 2002

Matthias Jarke, Jana Koehler, and Gerhard Lakemeyer.

KI 2002 Conference Organization

General Chair Matthias Jarke RWTH Aachen, Germany

Program Co-chair

Jana Koehler IBM Zurich Research Laboratory, Switzerland

Workshop Chair

Gerhard Weiss TU Munich, Germany

Program Co-chair Gerhard Lakemeyer

RWTH Aachen, Germany

Organizing Chair

Andreas Becks Fraunhofer FIT, Sankt Augustin, Germany

Program Committee

Elisabeth André	Germany	Gerhard Lakemeyer	Germany
Armin Biere	Switzerland	Thomas Malsch	Germany
Susanne Biundo	Germany	Martin Mueller	Canada
Ronen Brafman	Israel	Daniele Nardi	Italy
Gerhard Brewka	Germany	Bernhard Nebel	Germany
Thomas Christaller	Germany	Wolfgang Nejdl	Germany
Sven Dickinson	Canada	Hermann Ney	Germany
Dieter Fox	USA	Juergen Sauer	Germany
Gerhard Friedrich	Austria	Ute Schmid	Germany
Ulrich Furbach	Germany	Dale Schuurmans	Canada
Holger Hoos	Canada	Kilian Stoffel	Switzerland
Ian Horrocks	UK	Michael Thielscher	Germany
Stefan Kirn	Germany	Wolfgang Wahlster	Germany
Jana Koehler	Switzerland	Gerhard Weiss	Germany
Rudolf Kruse	Germany	Stefan Wrobel	Germany

Organizing Committee

Andreas Becks	Fraunhofer FIT,	Alexander Ferrein	RWTH Aachen
	Sankt Augustin	Günter Gans	RWTH Aachen
Frank Dylla	RWTH Aachen	Irene Wicke	RWTH Aachen

Additional Referees

Steffen Albrecht Cyrille Artho Volker Baier Peter Baumgartner Christian Borgelt Ali Ghodsi Boushehri Felix Brandt Ralph Breithaupt Michael Brenner Diego Calvanese Ingo Dahn Georg Dorffner Christian Döring Peter Geibel Lilia Georgieva Erich Grädel

Axel Großmann Jesse Hoev Tamas Horvath Geoff Hulten Luca Iocchi Dietmar Jannach Jörg Kindermann Alexander Kleiner Aljoscha Klose Cody Kwok Edda Leopold David Lowe Maren Lübcke Thomas Lukasiewicz Silvia Miksch Bernd Müller

Matthias Nickles Kai Paetow Frank Pasemann Fuchun Peng Jochen Renz Jussi Rintanen Danny Roobaert Michael Rovatsos Andrew Rowley Marco Schmitt Viktor Schuppan Klaus Stein Frieder Stolzenburg Heiko Timm Thilo Weigel

KI 2002 Workshops

Workshop Chair Gerhard Weiss TU Munich. Germany

Foundations of Multiagent Systems: The Economic Theory Perspective

Resolving Conflicts between Self-interested Agents (RCSIA 2002)

Stefan Kirn Andreas Will Germany Germany

Ingo J. Timm Germany Torsten Eymann Germany

Modeling Artificial Societies and **Hybrid Organizations** (MASHO 2002)

Gabriela Lindemann Germany Catholijn M. Jonker The Netherlands Pietro Panzarasa U.K.

Workshop on Agent Standards in **Theory and Practice** (ASTAP 2002)

Michael Berger Germany Stefan Kirn Germany Jens Nimis Germany Ingo J. Timm Germany Ubbo Visser Germany

Workshop on Applications of Description Logics (ADL 2002)

Günther Görz Volker Haarslev Carsten Lutz Ralf Möller

Germany Germany Germany Germany

Workshop on **Cognitive Agents**

Michael Thielscher

Germany

Table of Contents

Natural Language

LIGHT – A Constraint Language and Compiler System for Typed-Unification Grammars <i>Liviu Ciortuz</i>	3
Phrase-Based Statistical Machine Translation Richard Zens, Franz Josef Och, Hermann Ney	18
Compiling Dynamic Agent Conversations Pierre Bonzon	33

Machine Learning – Combined Approaches

Dynamic Pricing of Information Products Based on Reinforcement	
Learning: A Yield-Management Approach	51
Michael Schwind, Oliver Wendt	
Incremental Fuzzy Decision Trees	67
Marina Guetova, Steffen Hölldobler, Hans-Peter Störr	
Learning from Multiple Bayesian Networks for the Revision and	
Refinement of Expert Systems	82
Michael Borth	

Knowledge Representation, Semantic Web, AI Planning

On the Problem of Computing Small Representations of Least Common
Subsumers
Franz Baader, Anni-Yasmin Turhan
Approximate Information Filtering on the Semantic Web 114 Heiner Stuckenschmidt
ParleE: An Adaptive Plan Based Event Appraisal Model of Emotions 129 The Duy Bui, Dirk Heylen, Mannes Poel, Anton Nijholt
Integrating Function Application in State-Based Planning 144 Ute Schmid, Marina Müller, Fritz Wysotzki
Machina Loarning – Noural Notworks

Machine Learning – Neural Networks

Fast '	Winner-7	Takes-A	ll Net	works fo	or the	Maximum	Clique	Problem.	 163
B	rijnesh J	. Jain,	Fritz	Wysotzk	ci				

Michael Wooldridge

Augmenting Supervised Neural Classifier Training Using a Corpus of Unlabeled Data
Learning of Class Descriptions from Class Discriminations: A Hybrid Approach for Relational Objects
Logic Programming – Theorem Proving – Model Checking
The Well-Founded Semantics Is a Stratified Fitting Semantics
Axiomatization of Finite Algebras
Algorithms for Guiding Clausal Temporal Resolution
Vision and Spatial Reasoning
Axiom – A Modular Visual Object Retrieval System
Representation of Behavioral Knowledge for Planning and Plan-Recognition in a Cognitive Vision System
Qualitative Velocity and Ball Interception
Spatial Inference – Learning vs. Constraint Solving
Invited Presentations
From Simulated Dialogues to Interactive Performances with Virtual Actors
Time, Knowledge, and Cooperation: Alternating-Time Temporal Epistemic Logic and Its Applications

Semantic Web Enabled Web Services	319
Dieter Fensel	

DFG Priority Programs

DFG Priority Program RoboCup (SPP-1125): Cooperating Teams of Mobile Robots in Dynamic Environments	3
Thomas Christaller DFG Priority Program (SPP-1083): Intelligent Agents and Realistic Commercial Application Scenarios	4
DFG Priority Program (SPP-1077): Socionics – Investigating and Modelling Artificial Societies	5
Author Index	7