V. Mařík O. Štěpánková R. Trappl (Eds.)

Ce 01-617

Advanced Topics in Artificial Intelligence

International Summer School Prague, Czechoslovakia, July 6-17, 1992 Proceedings

Springer-Verlag

Berlin Heidelberg New York London Paris Tokyo Hong Kong Barcelona Budapest Series Editor

Jörg Siekmann University of Saarland German Research Center for Artificial Intelligence (DFKI) Stuhlsatzenhausweg 3, W-6600 Saarbrücken 11, FRG

Volume Editors

Vladimír Mărík Olga Štěpánková Czech Technical University, Faculty of Electrical Engineering Technická 2, 16627 Prague 6, Czechoslovakia

Robert Trappl

Austrian Research Institute for Artificial Intelligence (ÖFAI) and Dept. of Medical Cybernetics and Artificial Intelligence, University of Vienna Schottengasse 3, A-1010 Vienna, Austria

6241

CR Subject Classification (1991): 4.2, K.3, J.4, J.6

ISBN 3-540-55681-8 Springer-Verlag Berlin Heidelberg New York ISBN 0-387-55681-8 Springer-Verlag New York Berlin Heidelberg

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 1992 Printed in Germany

Typesetting: Camera ready by author/editor Printing and binding: Druckhaus Beltz, Hemsbach/Bergstr. 45/3140-543210 - Printed on acid-free paper

Foreword

This volume contains the texts of 26 lectures and contributions to the program of the International Summer School Advanced Topics in Artificial Intelligence held in Prague, Czechoslovakia, July 6-17, 1992.

The International Summer School was jointly organized by the Austrian Research Institute for Artificial Intelligence, Vienna, Austria, by the Faculty of Electrical Engineering, Czech Technical University, Prague, Czechoslovakia, by the Department of Medical Cybernetics and AI, University of Vienna, Austria, and by the Technical University of Brno, Czechoslovakia, under the sponsorship of the European Coordinating Committee for Artificial Intelligence (ECCAI) and with significant support from EC Project TEMPUS No. 1191 TAIC. We gratefully acknowledge the help of all the cooperating institutions mentioned above. We would like to express our special appreciation to Dr. Pavel Brázdil, coordinator of the TEMPUS Project, for his admirable understanding and support in many respects.

The International Summer School Advanced Topics in Artificial Intelligence is intended for (postgraduate) students, researchers and all those who want to learn about recent progress in both theoretical and applied AI. We hope that this event will also help to satisfy the needs for information within the expanding AI community in the post-communist countries.

We would like to give our cordial thanks to many people who have encouraged us and helped, namely those co-operating with us in the Advisory Board: Prof. Ivan Bratko (University of Ljubljana, Slovenia), Dr. Pavel Brázdil (University of Porto, Portugal), Prof. Nicholas V. Findler (Arizona State University), Dr. Eva Hajičová (Charles University, Prague), Prof. George J. Klir (State University of New York), Prof. Yves Kodratoff (University Paris-Sud), Prof. Robert Kowalski (Imperial College, London), Dr. Igor Mozetič (Austrian Research Institute for AI, Vienna) and Dr. Sam W. Steel (University of Essex, UK).

We are highly indebted to all the contributors for preparing their texts carefully and in time.

We gratefully acknowledge the substantial and critical role of all the members of the Organizing Committee and the Secretariat consisting of Dr. Lenka Lhotská, Ludmila Kolářová, Jitka Ešpandrová, Marie Měřičková, Isabella Ghobrial-Willmann and Mag. Gerda Helscher.

Last but not least we wish to thank Springer-Verlag for its excellent cooperation in preparing this publication.

Prague, Vienna, May 1992

V. Mařík, O. Štěpánková, R. Trappl

CUENA, J.

Part 4: Planning and Scheduling
Notes on Current Trends in Al Planning
The Application of Reason Maintenance Systems in Planning and Scheduling 208 $KELLEHER,\ G.$
Practical Applications of Planning Tasks
Part 5: Uncertainty
The Role of Uncertainty Measures and Principles in AI
Introduction to Probabilistic Methods of Knowledge Representation and Processing
On Belief Functions
Data Analysis and Uncertainty Processing
Part 6: Second Generation Expert Systems and Knowledge Engineering
Some Aspects of Knowledge Engineering
An Automatic Knowledge Acquisition Tool
Distributed AI and its Applications
Architectures for Second Generation Knowledge Based Systems

Part 7: Qualitative Reasoning
An Introduction to Qualitative Reasoning
Model-Based Diagnosis: An Overview
Dynamic System Simulation with Qualitative Differential Equations 431 BRATKO, I.
Part 8: Neurocomputing
An Introduction to Neurocomputing and its Possible Role in AI
Part 9: Natural Language and Interfaces
Intelligent Presentation and Dialogue Management
Linguistic Aspects of Natural Language Processing