

Lecture Notes in Artificial Intelligence 2902

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Springer

Berlin

Heidelberg

New York

Hong Kong

London

Milan

Paris

Tokyo

Fernando Moura Pires Salvador Abreu (Eds.)

Progress in Artificial Intelligence

11th Portuguese Conference
on Artificial Intelligence, EPIA 2003
Beja, Portugal, December 4-7, 2003
Proceedings



Springer

Series Editors

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

Volume Editors

Fernando Moura Pires

Salvador Abreu

Universidade de Évora, Departamento de Informática
Rua Romão Ramalho, 59 - 7000 Évora, Portugal
E-mail: spa@di.uevora.pt

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 Nationalbibliografie;
detailed bibliographic data is available in the Internet at <<http://dnb.ddb.de>>.

CR Subject Classification (1998): I.2, H.2, F.1, H.3, D.1.6

ISSN 0302-9743

ISBN 3-540-20589-6 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 is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2003
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Protago-TeX-Production GmbH
Printed on acid-free paper SPIN: 10971338 06/3142 5 4 3 2 1 0

Preface

When we set about organizing EPIA 2003 in Porto during the APPIA meeting at the previous edition of the conference, EPIA 2001, it was decided that it would be organized by Fernando Moura Pires (Fajé) and myself. We chose Beja as the venue to host the conference, as it provided a good support infrastructure and Fernando had a good working relationship with several people at the Beja Polytechnic Institute.

Shortly thereafter, Fernando came to know that he was ailing from a disease that was to take his life in May 2003. As with many other projects in which he got involved, Fernando clung to the organization of this conference with dedication and perseverance, even while knowing that he might not see the results of his work. EPIA 2003 is a tribute to his work.

Taking up on the successful experience gained from EPIA 2001, we decided to structure EPIA 2003 as a set of five distinct workshops, roughly reflecting the panorama of AI research in Portugal. Special thanks are due to the organizers of each workshop, for the quality and timeliness of the work they carried out.

The conference was all the more interesting because of the eight invited presentations and tutorials, by Alexander Bockmayr, Amílcar Cardoso, Dario Floreano, Harold Boley, Pedro Domingos, Pieter Adriaans, Veronica Dahl and Vitor Santos Costa. There are short one-page abstracts included in these proceedings for some of these presentations.

This volume reflects the organization of the conference. There were a total of 119 articles submitted across the five workshops, of which 29 (24%) were selected as full-size papers and 21 (18%) as extended abstracts, one of which could not be presented for other reasons. These numbers indicate that the present model for EPIA is a sound one, particularly when compared with those for the two previous editions (1999 and 2001).

Submissions came from 24 different countries: 37 from Portugal, 11 each from Spain and South Korea, 6 each from Brazil, France and the US, and 5 or fewer from Australia, China, the Czech Republic, Germany, Denmark, Hungary, Iran, Italy, Lithuania, Mexico, The Netherlands, Poland, Singapore, Tunisia, Turkey, Taiwan, the UK and Venezuela.

The contributions were distributed among the workshops as follows:

| Workshop | Submitted | Full | Short | Total |
|--------------|------------|-----------|-----------|-----------|
| ALEA | 27 | 6 | 3 | 9 |
| CLPS | 13 | 4 | 2 | 6 |
| EKDB | 39 | 9 | 6 | 15 |
| MAAII | 18 | 5 | 3 | 8 |
| NLTR | 22 | 5 | 7 | 12 |
| Total | 119 | 29 | 21 | 50 |

Thanks are due to the program committee members and reviewers, without whose work the conference would not have been possible.

An acknowledgement is due to FACC/FCT (Portuguese governmental funding agency) for its financial support, to the Instituto Politécnico de Beja and to the Universidade de Évora. Other sponsors are publicly acknowledged on the conference's Web site (<http://www.di.uevora.pt/epia03/>).

Besides co-chairing one of the workshops, Paulo Quaresma assisted me in various organizational aspects of EPIA 2003, for which I am thankful. Special thanks go to the local organization, in particular to Isabel Sofia Brito and Raúl Moizão of ESTIG, Instituto Politécnico de Beja, for coordinating and mobilizing the necessary resources. The knowledge and efficiency of Mrs. Filipa Reis was essential in effectively organizing and managing the conference.

So long, Fajé,

September 2003

Salvador Abreu

Organization

EPIA 2003 was jointly organized by the Department of Computer Science, Universidade de Évora and the School of Technology and Management, Polytechnic Institute of Beja, under the auspices of APPIA (Associação Portuguesa para a Inteligência Artificial).

Program Committee Co-chairs

| | |
|----------------------|---------------------------------|
| Fernando Moura Pires | Universidade de Évora, Portugal |
| Salvador Abreu | Universidade de Évora, Portugal |

Workshop Organizers

ALEA – Workshop on Artificial Life and Evolutionary Algorithms

| | |
|-------------------|--|
| Ernesto Costa | Universidade de Coimbra, Portugal |
| Francisco Pereira | Instituto Politécnico de Coimbra, Portugal |

CLPS – Workshop on Constraint and Logic Programming Systems

| | |
|----------------|---------------------------------------|
| Fernando Silva | Universidade do Porto, Portugal |
| Pedro Barahona | Universidade Nova de Lisboa, Portugal |

EKDB – Workshop on Extraction of Knowledge from Data Bases

| | |
|------------------|--|
| Arlindo Oliveira | Universidade Técnica de Lisboa, Portugal |
| Carlos Bento | Universidade de Coimbra, Portugal |
| João Gama | Universidade do Porto, Portugal |

MAAI – Multi-Agents and AI for the Internet

| | |
|-----------------|---------------------------------------|
| Carlos Damásio | Universidade Nova de Lisboa, Portugal |
| José Maia Neves | Universidade do Minho, Portugal |

NLTR – Natural Language and Text Retrieval

| | |
|-----------------|---------------------------------|
| Irene Rodrigues | Universidade de Évora, Portugal |
| Paulo Quaresma | Universidade de Évora, Portugal |

Full Program Committees

ALEA

| | |
|---------------------------|------------------------------|
| Carlos Fonseca (Portugal) | Colin Reeves (UK) |
| Conor Ryan (Ireland) | Dario Floreano (Switzerland) |
| Ernesto Costa (Portugal) | Francisco Pereira (Portugal) |
| Luís Correia (Portugal) | Luís Rocha (USA) |

CLPS

Enrico Pontelli (USA)
Frederic Benhamou (France)
Inês de Castro Dutra (Brazil)
Mark Wallace (UK)
Philippe Codognet (France)
Salvador Abreu (Portugal)

Fernando Silva (Portugal)
Gopal Gupta (USA)
Manuel Carro (Spain)
Pedro Barahona (Portugal)
Ricardo Rocha (Portugal)
Thom Frühwirth (Germany)

EKDB

Alípio Jorge (Portugal)
Carlos Bento (Portugal)
João Gama (Portugal)
Lee Giles (USA)
Mário Nascimento (Canada)
Rajesh Parekh (USA)

Arlindo Oliveira (Portugal)
Fernando Moura Pires (Portugal)
José Riquelme Santos (Spain)
Luís Torgo (Portugal)
Pieter Adriaans (The Netherlands)

MAAI

Ana Paiva (Portugal)
Carlos Damásio (Portugal)
Gerd Wagner (The Netherlands)
Hélder Coelho (Portugal)
João Alexandre Leite (Portugal)
José Maia Neves (Portugal)
Manuel Filipe Santos (Portugal)
Terrance Swift (USA)
Ulrike Sattler (Germany)
Vipul Kashyap (USA)

António Mário Florido (Portugal)
Carlos Ramos (Portugal)
Graça Gaspar (Portugal)
Helena Sofia Pinto (Portugal)
José Machado (Portugal)
Luís Botelho (Portugal)
Michael Schroeder (UK)
Thomas Eiter (Austria)
Victor Alves (Portugal)
Wiebe van der Hoek (UK)

NLTR

Andrew Mowbray (Australia)
João Paulo Neto (Portugal)
Lucia Helena Machado Rino (Brazil)
Nuno Mamede (Portugal)
Vera Lúcia Strube de Lima
(Brazil)

Irene Rodrigues (Portugal)
José Gabriel Pereira Lopes (Portugal)
Maria das Graças Volpe Nunes (Brazil)
Paulo Quaresma (Portugal)
Veronica Dahl (Canada)

Reviewers

Alexander Dikovsky
Alicia Troncoso
Alípio Jorge
Ana Paiva
Ana Teresa Freitas
Andrew Mowbray

Arlindo Oliveira
Arlindo Silva
Bernadete Ribero
Carlos Bento
Carlos Damásio
Carlos Fonseca

Carlos Ramos
Cláudia Antunes
Colin Reeves
Conor Ryan
Dario Floreano
Eduardo Correia

| | | |
|--------------------------|----------------------|------------------------|
| Enrico Pontelli | Jorge Tavares | Paulo J. Azevedo |
| Ernesto Costa | José Álvarez Macías | Paulo Quaresma |
| Fernando Silva | José Machado | Pedro Barahona |
| Francisco Ferrer-Troyano | José Maia Neves | Philippe Codognet |
| Francisco Pereira | José Riquelme Santos | Pieter Adriaans |
| Frédéric Benhamou | Lee Giles | Rajesh Parekh |
| Frédéric Saubion | Lucia Machado Rino | Ralf Schweimeier |
| Gabriel Pereira Lopes | Luísa Coheur | Raúl Giráldez |
| Gerd Wagner | Luís Botelho | Renata Souza Guizzardi |
| Gladys Castillo | Luís Correia | Ricardo Lopes |
| Glendon R. Holst | Luís Moniz Pereira | Ricardo Rocha |
| Gopal Gupta | Luís Rocha | Roberto Ruiz |
| Graça Gaspar | Luis Talavera | Rogério Reis |
| Helder Coelho | Luís Torgo | Rokia Missaoui |
| Helena Galhardas | Manuel Carro | Rui Batoreo Amaral |
| Helena Sofia Pinto | Manuel Filipe Santos | Salvador Abreu |
| Hervé Paulino | Maria Volpe Nunes | Sara C. Madeira |
| Hugo Santos Meinedo | Mário Florido | Terrance Swift |
| Iñaki Inza | Mário Nascimento | Thomas Eiter |
| Inês de Castro Dutra | Mark Wallace | Thom Frühwirth |
| Irene Rodrigues | Michael Heusch | Ulrike Sattler |
| Jacinto Mata Vázquez | Michael Schroeder | Vera Lúcia Strube Lima |
| Jesús S. Aguilar-Ruiz | Miguel Filgueiras | Veronica Dahl |
| João Alexandre Leite | Nelma Moreira | Victor Alves |
| João Gama | Nuno Mamede | Vipul Kashyap |
| João Paulo Neto | Paulo Gomes | Wiebe van der Hoek |

Table of Contents

Abstracts of Invited Presentations and Tutorials

| | |
|--|----|
| Constraint Programming in Computational Molecular Biology | 1 |
| <i>Alexander Bockmayr</i> | |
| Computational Creativity | 2 |
| <i>Amílcar Cardoso, Penousal Machado</i> | |
| From Wheels to Wings with Evolutionary Spiking Circuits | 3 |
| <i>Dario Floreano, Jean-Christophe Zufferey, Jean-Daniel Nicoud</i> | |
| An Introduction to Object-Oriented RuleML | 4 |
| <i>Harold Boley</i> | |
| Learning from Networks of Examples | 5 |
| <i>Pedro Domingos, Matt Richardson</i> | |
| Grammar Induction and Adaptive Information Disclosure | 6 |
| <i>Pieter Adriaans</i> | |
| Understanding Implicit Language Structures | 7 |
| <i>Veronica Dahl</i> | |
| Performance Issues in Prolog Applications | 8 |
| <i>Vítor Santos Costa</i> | |
| Artificial Life and Evolutionary Algorithms (ALEA) | |
| Optimization of Logistic Processes in Supply-Chains Using Meta-heuristics | 9 |
| <i>Carlos A. Silva, Thomas A. Runkler, João M. Sousa, José M. Sá da Costa</i> | |
| Evolutionary Neural Network Learning | 24 |
| <i>Miguel Rocha, Paulo Cortez, José Neves</i> | |
| Golomb Rulers: The Advantage of Evolution | 29 |
| <i>Francisco B. Pereira, Jorge Tavares, Ernesto Costa</i> | |
| A Particle Swarm Data Miner | 43 |
| <i>Tiago Sousa, Arlindo Silva, Ana Neves</i> | |
| Yerkes-Dodson Law in Agents' Training | 54 |
| <i>Šarūnas Raudys, Viktoras Justickis</i> | |

| | |
|---|-----|
| SAPPO: A Simple, Adaptable, Predator Prey Optimiser | 59 |
| <i>Arlindo Silva, Ana Neves, Ernesto Costa</i> | |
| Evolutionary Neuroestimation of Fitness Functions | 74 |
| <i>Jesus S. Aguilar-Ruiz, Daniel Mateos, Domingo S. Rodriguez</i> | |
| A Resource Sharing Model to Study Social Behaviours | 84 |
| <i>Pedro Mariano, Luís Correia</i> | |
| Improving Self-Confidence: An Advise-Based Evolutionary Model | 89 |
| <i>Ivette C. Martínez, Miguel A. Castro, Carlos D. Castillo</i> | |
| Constraint and Logic Programming Systems (CLPS) | |
| Solving Set Partitioning Problems with Global Constraint Propagation | 101 |
| <i>Ricardo Saldanha, Ernesto Morgado</i> | |
| Heuristic-Based Backtracking for Propositional Satisfiability | 116 |
| <i>Ateet Bhalla, Inês Lynce, José T. de Sousa, João Marques-Silva</i> | |
| On the BEAM Implementation | 131 |
| <i>Ricardo Lopes, Vítor Santos Costa, Fernando Silva</i> | |
| YapDss: An Or-Parallel Prolog System for Scalable Beowulf Clusters | 136 |
| <i>Ricardo Rocha, Fernando Silva, Rolando Martins</i> | |
| Experimental Evaluation of a Caching Technique for ILP | 151 |
| <i>Nuno Fonseca, Vitor Santos Costa, Fernando Silva, Rui Camacho</i> | |
| jcc: Integrating Timed Default Concurrent Constraint Programming into JAVA | 156 |
| <i>Vijay Saraswat, Radha Jagadeesan, Vineet Gupta</i> | |
| Extraction of Knowledge from Data Bases (EKDB) | |
| BAYES-NEAREST: A New Hybrid Classifier Combining Bayesian Network and Distance Based Algorithms | 171 |
| <i>Elena Lazkano, Basilio Sierra</i> | |
| A Data Mining Approach to Credit Risk Evaluation and Behaviour Scoring | 184 |
| <i>Sara C. Madeira, Arlindo L. Oliveira, Catarina S. Conceição</i> | |
| Influence of kNN-Based Load Forecasting Errors on Optimal Energy Production | 189 |
| <i>Alicia Troncoso Lora, José C. Riquelme, José Luís Martínez Ramos, Jesús M. Riquelme Santos, Antonio Gómez Expósito</i> | |

| | |
|---|-----|
| Creating User-Adapted Design Recommender System through Collaborative Filtering and Content Based Filtering | 204 |
| <i>Kyung-Yong Jung, Young-Joo Na, Jung-Hyun Lee</i> | |
| Is the UCI Repository Useful for Data Mining? | 209 |
| <i>Carlos Soares</i> | |
| Improving the Efficiency of ILP Systems | 224 |
| <i>Rui Camacho</i> | |
| Reorganizing News Web Pages for Mobile Users..... | 229 |
| <i>Woncheol Kim, Eenjun Hwang, Wonil Kim</i> | |
| Learning Semi Naïve Bayes Structures by Estimation of Distribution Algorithms | 244 |
| <i>Victor Robles, Pedro Larrañaga, José M. Peña, María S. Pérez, Ernestina Menasalvas, Vanessa Herves</i> | |
| Learning Action Theories with Ramifications | 259 |
| <i>David Lorenzo</i> | |
| Mining Low Dimensionality Data Streams of Continuous Attributes | 264 |
| <i>Francisco J. Ferrer-Troyano, Jesús S. Aguilar-Ruiz, José C. Riquelme</i> | |
| Adaptation to Drifting Concepts | 279 |
| <i>Gladys Castillo, João Gama, Pedro Medas</i> | |
| Border Detection on Remote Sensing Satellite Data Using Self-Organizing Maps | 294 |
| <i>Nuno C. Marques, Ning Chen</i> | |
| Predicting Harmful Algae Blooms | 308 |
| <i>Rita Ribeiro, Luis Torgo</i> | |
| Improving Progressive Sampling via Meta-learning | 313 |
| <i>Rui Leite, Pavel Brazdil</i> | |
| Multi-Agents and AI for the Internet (MAAII) | |
| Distributed Learning Agents in Urban Traffic Control | 324 |
| <i>Eduardo Camponogara, Werner Kraus Jr</i> | |
| The Chatbot Feeling – Towards Animated Emotional ECAs | 336 |
| <i>Gábor Tatai, Annamária Csordás, Attila Szaló, László Laufer</i> | |
| Using CLIPS to Detect Network Intrusions | 341 |
| <i>Pedro Alipio, Paulo Carvalho, José Neves</i> | |

| | |
|--|-----|
| Model for Dialogue between Informational Agents | 355 |
| <i>Erika Valencia, Jean-Paul Sansonnnet</i> | |
| A Possibilistic Logic Modeling of Autonomous Agents Negotiation | 360 |
| <i>Leila Amgoud, Henri Prade</i> | |
| Towards Individual Power Design (Rediscovering the Will of Acting Agents) | 366 |
| <i>Francisco Coelho, Helder Coelho</i> | |
| An Architecture for a Rational Reactive Agent | 379 |
| <i>Pierangelo Dell'Acqua, Mattias Engberg, Luís Moniz Pereira</i> | |
| An Evolvable Rule-Based E-mail Agent | 394 |
| <i>José Júlio Alferes, Antonio Brogi, João Alexandre Leite, Luís Moniz Pereira</i> | |
| Natural Language and Text Retrieval (NLTR) | |
| Automatic Summarization Based on Principal Component Analysis | 409 |
| <i>Chang Beom Lee, Min Soo Kim, Hyuk Ro Park</i> | |
| A Constraint Grammar Based Question Answering System for Portuguese | 414 |
| <i>Eckhard Bick</i> | |
| Mining Generalized Character n-Grams in Large Corpora | 419 |
| <i>Nuno C. Marques, Agnès Braud</i> | |
| A Methodology to Create Ontology-Based Information Retrieval Systems | 424 |
| <i>José Saias, Paulo Quaresma</i> | |
| A Preliminary Approach to the Multilabel Classification Problem of Portuguese Juridical Documents | 435 |
| <i>Teresa Gonçalves, Paulo Quaresma</i> | |
| Synonymy for Query Expansion in Information Search | 445 |
| <i>Rove Chishman, Renata Vieira, Isa Mara Alves, Sandro Rigo</i> | |
| Web Information Retrieval with Result Set Clustering | 450 |
| <i>Mário J. Silva, Bruno Martins</i> | |
| ASdeCopas: A Syntactic-Semantic Interface | 455 |
| <i>Luisa Coheur, Nuno Mamede, Gabriel G. Bès</i> | |
| Automatic Selection of Table Areas in Documents for Information Extraction | 460 |
| <i>Ana Costa e Silva, Alípio Jorge, Luís Torgo</i> | |

| | |
|---|------------|
| Mandarin Question Sentence Detection: A Preliminary Study | 466 |
| <i>Ping-Jer Yeh, Shyan-Ming Yuan</i> | |
| Acquiring Semantic Classes to Elaborate Attachment Heuristics | 479 |
| <i>Pablo Gamallo, Alexandre Agustini, Gabriel P. Lopes</i> | |
| Managing Dialog in a Natural Language Querying System | 488 |
| <i>Luis Quintano, Irene Rodrigues</i> | |
| Author Index | 503 |