Research and Development in Intelligent Systems XXI

Proceedings of AI-2004, the Twenty-fourth SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence



Professor Max Bramer, BSc, PhD, CEng, FBCS, FIEE, FRSA Faculty of Technology, University of Portsmouth, Portsmouth, UK

Dr Frans Coenen Department of Computer Science, University of Liverpool, Liverpool, UK

Dr Tony Allen Nottingham Trent University

British Library Cataloguing in Publication Data A catalogue record for this book is available from the British Library

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency. Enquiries concerning reproduction outside those terms should be sent to the publishers.

ISBN 1-85233-907-1 Springer is part of Springer Science+Business Media springeronline.com

© Springer-Verlag London Limited 2005 Printed in Great Britain

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant laws and regulations and therefore free for general use.

The publisher makes no representation, express or implied, with regard to the accuracy of the information contained in this book and cannot accept any legal responsibility or liability for any errors or omissions that may be made.

Typesetting: Camera-ready by editors Printed and bound at the Athenæum Press Ltd., Gateshead, Tyne & Wear 34/3830-543210 Printed on acid-free paper SPIN 11006770

TECHNICAL PROGRAMME CHAIR'S INTRODUCTION

M.A.BRAMER

University of Portsmouth, UK

This volume comprises the refereed technical papers presented at AI-2004, the Twenty-fourth SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence, held in Cambridge in December 2004. The conference was organised by SGAI, the British Computer Society Specialist Group on Artificial Intelligence.

The papers in this volume present new and innovative developments in the field, divided into sections on AI Techniques I and II, CBR and Recommender Systems, Ontologies, Intelligent Agents and Scheduling Systems, Knowledge Discovery in Data and Spatial Reasoning and Image Recognition.

This year's prize for the best refereed technical paper was won by a paper entitled *Extracting Finite Structure from Infinite Language* by T. McQueen, A. A. Hopgood, T. J. Allen and J. A. Tepper (School of Computing & Informatics, Nottingham Trent University, UK). SGAI gratefully acknowledges the long-term sponsorship of Hewlett-Packard Laboratories (Bristol) for this prize, which goes back to the 1980s.

This is the twenty-first volume in the *Research and Development* series. The Application Stream papers are published as a companion volume under the title *Applications and Innovations in Intelligent Systems XII*.

On behalf of the conference organising committee I should like to thank all those who contributed to the organisation of this year's technical programme, in particular the programme committee members, the executive programme committee and our administrators Linsay Turbert and Collette Jackson.

Max Bramer Technical Programme Chair, AI-2004

ACKNOWLEDGEMENTS

AI-2004 CONFERENCE COMMITTEE

Dr. Tony Allen, Nottingham Trent University

Dr Robert Milne, Sermatech Intelligent Applications Ltd

Dr. Alun Preece, University of Aberdeen

Dr Nirmalie Wiratunga, Robert Gordon University, Aberdeen

Prof. Adrian Hopgood Nottingham Trent University

Prof. Ann Macintosh Napier University

Richard Ellis Stratum Management Ltd

Professor Max Bramer University of Portsmouth

Dr Frans Coenen, University of Liverpool

Dr. Bob Howlett, University of Brighton

Rosemary Gilligan

(Conference Chair)

(Deputy Conference Chair, Finance and Publicity)

(Deputy Conference Chair, Electronic Services)

(Deputy Conference Chair, Poster Session)

(Tutorial Organiser)

(Application Programme Chair)

(Deputy Application Programme Chair)

(Technical Programme Chair)

(Deputy Technical Programme Chair)

(Exhibition Organiser)

(Research Student Liaison)

TECHNICAL EXECUTIVE PROGRAMME COMMITTEE

Prof. Max Bramer, University of Portsmouth (Chair)
Dr. Frans Coenen, University of Liverpool (Vice-Chair)
Dr. Tony Allen, Nottingham Trent University
Prof. Adrian Hopgood, Nottingham Trent University
Mr. John Kingston, University of Edinburgh
Dr. Peter Lucas, University of Nijmegen, The Netherlands
Dr. Alun Preece, University of Aberdeen

TECHNICAL PROGRAMME COMMITTEE

Alia Abdelmoty (Cardiff University)Mercedes Go
ComplutenseAndreas A Albrecht (University of
Hertfordshire)Martin Grabr
Universität BTony Allen (Nottingham Trent
University)Anne Håkans
Sweden)Somaya A. S. Almaadeed (Qatar
University)Mark Hall (U
Zealand)Yaxin Bi (Queen's University Belfast)Eveline M. H
Ray Hickey (

Max Bramer (University of Portsmouth)

Ken Brown (University College Cork)

Frans Coenen (University of Liverpool)

Bruno Cremilleux (University of Caen)

Juan A. Fdez. del Pozo (Technical University of Madrid)

Marina De Vos (University of Bath)

John Debenham (University of Technology, Sydney)

Stefan Diaconescu (Softwin)

Nicolas Durand (University of Caen)

Anneli Edman (University of Upsala)

Mark Elshaw (University of Sunderland)

Max Garagnani (The Open University)

Adriana Giret (Universidad Politecnica de Valencia)

Mercedes Gomez Albarran (Univ. Complutense de Madrid)

Martin Grabmüller (Tehcnische Universität Berlin)

Anne Håkansson (Uppsala University, Sweden)

Mark Hall (University of Waikato, New Zealand)

Eveline M. Helsper (Utrecht University)

Ray Hickey (University of Ulster)

Adrian Hopgood (The Nottingham Trent University)

Chihli Hung (De Lin Institute of Technology, Taiwan)

Piotr Jedrzejowicz (Gdynia Maritime University, Poland)

John Kingston (University of Edinburgh)

T. K. Satish Kumar (Stanford University)

Alvin C. M. Kwan (University of Hong Kong)

Brian Lees (University of Paisley)

Peter Lucas (University of Nijmegen)

Angeles Manjarrés (Universidad Nacional de Educación a Distancia, Spain)

Daniel Manrique Gamo

Raphaël Marée (University of Liège, Belgium)

David McSherry (University of Ulster)

Alfonsas Misevicius (Kaunas University of Technology)

Ernest Muthomi Mugambi (Sunderland University, UK)

Lars Nolle (Nottingham Trent University)

Tomas Eric Nordlander (University of Aberdeen)

Tim Norman (University of Aberdeen)

Dan O'Leary (University of Southern California)

Barry O'Sullivan (University College Cork)

Alun Preece (University of Aberdeen)

Gerrit Renker (Robert Gordon University)

María Dolores Rodríguez-Moreno (Universidad de Alcalá)

Fernando Sáenz Pérez (Universidad Complutense de Madrid)

Miguel A. Salido (Universidad de Alicante)

Barry Smyth (University College Dublin)

Jon Timmis (University of Kent)

Kai Ming Ting (Monash University)

Andrew Tuson (City University)

M.R.C. van Dongen (University College Cork)

Ian Watson (University of Auckland)

Graham Winstanley (University of Brighton)

Nirmalie Wiratunga (Robert Gordon University)

Shengxiang Yang (University of Leicester)

CONTENTS

BEST TECHNICAL PAPER

Extracting Finite Structure from Infinite Language (x)	
T. McQueen, A. A. Hopgood, T. J. Allen and J. A. Tepper, School of Computing	
& Informatics, Nottingham Trent University, UK	3

SESSION 1a: AI TECHNIQUES I

Modelling Shared Extended Mind and Collective Representational Content Tibor Bosse, Catholijn M. Jonke and Martijn C. Schut, Department of Artificial Intelligence, Vrije Universiteit Amsterdam; Jan Treur, Department of Artificial Intelligence, Vrije Universiteit Amsterdam and Department of Philosophy,	
Universiteit, Utrecht	19
Overfitting in Wrapper-Based Feature Subset Selection: The Harder You Try the Worse it Gets	
John Loughrey and Pádraig Cunningham, Trinity College Dublin, Ireland	33
Managing Ontology Versions with a Distributed Blackboard Architecture Ernesto Compatangelo, Wamberto Vasconcelos and Bruce Scharlau,	
Department of Computing Science, University of Aberdeen	44
OntoSearch: An Ontology Search Engine Yi Zhang, Wamberto Vasconcelos and Derek Sleeman, Department of Computing Science, University of Aberdeen, Aberdeen, UK	58
SESSION 1b: CBR AND RECOMMENDER SYSTEMS	
Case Based Adaptation Using Interpolation over Nominal Values Brian Knight, University of Greenwich, UK and Fei Ling Woon, Tunku Abdul Rahman College, Kuala Lumpur, Malaysia	73
Automating the Discovery of Recommendation Rules David McSherry, School of Computing and Information Engineering, University of Ulster, Northern Ireland	87
Incremental Critiquing (x) James Reilly, Kevin McCarthy, Lorraine McGinty and Barry Smyth, Department of Computer Science, University College Dublin, Ireland	101

Note: x indicates SGAI recognition award

SESSION 2: AI TECHNIQUES II

XII

A Treebank-Based Case Role Annotation Using An Attributed String Matching Samuel W.K.Chan, Department of Decision Sciences, The Chinese University of Hong Kong, Hong Kong, China	117
A Combinatorial Approach to Conceptual Graph Projection Checking Madalina Croitoru and Ernesto Compatangelo, Department of Computing Science, University of Aberdeen	130
Implementing Policy Management Through BDI Simon Miles, Juri Papay, Michael Luck and Luc Moreau, University of Southampton, UK	144
Exploiting Causal Independence in Large Bayesian Networks (x) Rasa Jurgelenaite and Peter Lucas, Radboud University Nijmegen, The Netherlands	157
SESSION 3: INTELLIGENT AGENTS AND SCHEDULING SYSTEMS	
A Bargaining Agent Aims to `Play Fair' John Debenham, Faculty of Information Technology, University of Technology, Sydney, NSW, Australia	173
Resource Allocation in Communication Networks Using Market-Based Agents (x Nadim Haque, Nicholas R. Jennings and Luc Moreau, School of Electronics and Computer Science, University of Southampton, Southampton, UK	-
Are Ordinal Representations Effective? Andrew Tuson, Department of Computing, City University, UK	201
A Framework for Planning with Hybrid Models Max Garagnani, Department of Computing, The Open University, UK	214
SESSION 4: KNOWLEDGE DISCOVERY IN DATA	
Towards Symbolic Data Mining in Numerical Time Series Agustín Santamaría, Technical University of Madrid, Spain; África López-Illescas, High Council for Sports, Madrid, Spain; Aurora Perez-Perez and Juan P. Caraça-Valente, Technical University of Madrid, Spain	231

Support Vector Machines of Interval-based Features for Time Series	Interval-based Features for Time Series
Classification (x)	
Juan Jose Rodriguez, Universidad de Burgos, Spain and Carlos J. Alonso,	
Departamento de Informatica, Universidad de Valladolid, Spain	244

	XIII
Neighbourhood Exploitation in Hypertext Categorization Houda Benbrahim and Max Bramer, Department of Computer Science and Software Engineering, University of Portsmouth, UK	258
Using Background Knowledge to Construct Bayesian Classifiers for Data- Poor Domains Marcel van Gerven and Peter Lucas, Institute for Computing and Information Sciences, University of Nijmegen, The Netherlands	269
SESSION 5: SPATIAL REASONING, IMAGE RECOGNITION AND HYPERCUBES	
Interactive Selection of Visual Features through Reinforcement Learning Sebastien Jodogne and Justus H. Piater, Montefiore Institute, University of Liege, Belgium	285
Imprecise Qualitative Spatial Reasoning	
Baher El-Geresy, Department of Computer Studies, University of Glamorgan, UK and Alia Abdelmoty, Department of Computer Science, Cardiff University, UK	299
Reasoning with Geometric Information in Digital Space (x) Passent El-Kafrawy and Robert McCartney, Department of Computer Science and Engineering, University of Connecticut, USA	313
On Disjunctive Representations of Distributions and Randomization T. K. Satish Kumar, Knowledge Systems Laboratory, Stanford University	327
AUTHOR INDEX	341