Preface

The 12th Australian Joint Conference on Artificial Intelligence (AI'99) held in Sydney, Australia, 6-10 December 1999, is the latest in a series of annual regional meetings at which advances in artificial intelligence are reported. This series now attracts many international papers, and indeed the constitution of the program committee reflects this geographical diversity. Besides the usual tutorials and workshops, this year the conference included a companion symposium at which papers on industrial applications were presented. The symposium papers have been published in a separate volume edited by Eric Tsui. AI'99 is organized by the University of New South Wales, and sponsored by the Australian Computer Society, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Computer Sciences Corporation, the KRRU group at Griffith University, the Australian Artificial Intelligence Institute, and Neuron-Works Ltd.

AI'99 received over 120 conference paper submissions, of which about onethird were from outside Australia. From these, 39 were accepted for regular presentation, and a further 15 for poster display. These proceedings contain the full regular papers and extended summaries of the poster papers. All papers were refereed, mostly by two or three reviewers selected by members of the program committee, and a list of these reviewers appears later.

The technical program comprised two days of workshops and tutorials, followed by three days of conference and symposium plenary and paper sessions. Distinguished plenary speakers were invited to share their experience and expertise in AI with our delegates. Some workshops (Knowledge Acquisition, Commonsense Reasoning, AI Applications to Plant and Animal Production) also had their own invited speakers.

The plenary speakers were: Paul Beinat (NeuronWorks), Ussama Fayed (Microsoft Research), Michael Georgeff (Australian Artificial Intelligence Institute), Hiroshi Motoda (Osaka University), and Eugene C. Freuder (University of New Hampshire). The workshop speakers were: Takahira Yamaguchi (Shizuoka University) in Knowledge Acquisition, John McCarthy (Stanford University) and Michael Thielscher (Dresden University) in Commonsense Reasoning, and M.H. Rasmy (University of Cairo) in AI Applications in Plant and Animal Production. We thank our sponsors and the workshop organizers for supporting their visit.

The smooth running of AI'99 was largely due to its program committee, the administrative staff, the reviewers, the conference organizers CIM Pty Ltd, and the managers of the venue Coogee Holiday Inn.

We thank Springer-Verlag and its representative Alfred Hofmann for efficient assistance in producing these proceedings of AI'99 as a volume in Lecture Notes in Artificial Intelligence series.

October 1999 Norman Foo

VI Preface

AI'99 gratefully acknowledges financial support from the following sponsors:

The Artificial Intelligence and Expert Systems Committee of the Australian Computer Society

Commonwealth Scientific and Industrial Research Organisation (CSIRO) Computer Sciences Corporation (CSC)

Knowledge Representation and Reasoning Unit (KKRU), Griffith University

The Australian Artificial Intelligence Institute NeuronWorks Ltd

Organizing Committee

General Chair:

John Debenham University of Technology, Sydney

Conference Chair:

Norman Foo The University of New South Wales

Symposium Chair:

Eric Tsui Computer Sciences Corporation

Local Arrangements Chairs:

Graham Mann The University of New South Wales
Paul Compton The University of New South Wales

Workshop Chair:

Chengqi Zhang Deakin University

Tutorial Chair:

Mehmet Orgun Macquarie University

Conference Organizer:

CIM Conference and Incentive Management

Program Committee

Leila Alem CSIRO Sydney

Michael Brooks University of Adelaide Robert Dale Macquarie University Patrick Doherty University of Linköping

Phan Minh Dung Asian Institute of Technology

Peter Eklund Griffith University
John Gero University of Sydney
Greg Gibbon University of Newcastle
Jane Hsu National Taiwan University
William Havens Simon Fraser University

Joxan Jaffar National University of Singapore

Ray Jarvis Monash University
Dayou Liu Jilin University

Cara MacNish University of Western Australia

Kim Marriott Monash University

Tim Menzies NASA/WVU Software Research

Toshiro Minami Fujitsu Japan

Erica Mellis University of Saarland and DFKI

Maurice Pagnucco Macquarie University

VIII Organizing Committee

Jeff Pelletier University of Alberta

S. Ramesh Indian Institute of Technology, Bombay

John Slaney Australian National University
Liz Sonenberg University of Melbourne
Geoff Sutcliffe James Cook University
Geoff Webb Deakin University
Mary-Anne Williams University of Newcastle
Vilas Wuwongse Asian Institute of Technology

Wai Kiang Yeap University of Otago

Xinghuo Yu Central Queensland University Soe-Tsyr Yuan Fu-Jen Catholic University

Nevin Zhang Hong Kong University of Science & Technology

Administrators/Programmers

Dirk Freykamp The University of New South Wales Jane Brennan The University of New South Wales

Workshop Organizers

Debbie Richards Macquarie University Abdul Sattar Griffith University

Hussein Aly Abbass Queensland University of Technology

Mary-Anne Williams University of Newcastle

Ryszard Kowalczyk CSIRO

Tutorial Presenters

Abdul Sattar Griffith University Ann Nicholson Monash University David Dowe Monash University

AI'99 Reviewers

AI'99 is indebted to the following reviewers:

David Albrecht Leila Alem Jose Alferes Grigoris Antoniou Chutiporn Anutariya Takavuki Baba Chitta Baral Ghassan Beydoun Pushpak Bhattacharya Damien Brain Derek Bridge Bob Bogner Stefanie Bruninghaus Mike Cameron-Jones Marianne Brown Mike Carbonaro Lawrence Cavedon Scott Chase Bruce Cheek Jie Cheng Shing-Chi Cheung Richard Cole Stephen Cranefield Ingo Dahn Honghua Dai Robert Dale Phan Minh Dung Peter Eklund Yakov Frayman Alan M. Frisch Dava Gaur Hector Geffner John Gero Aditva Ghose Greg Gibbon H. Gotanda Stephen Green Russ Greiner Bernd Groh Joakim Gustafsson Patrik Haslum Michael Harries Bill Havens Clint Heinze Tim Hendtlass Anton van den Hengel Achim Hoffmann Michael C. Horsch Shinya Hosogi Zhivi Huang M. Irgens Rosemary Irrgang Joxan Jaffar R. A. Jarvis Margaret E. Jefferies Jun Jo A. C. Kakas Mike Kalish Joarder Kamruzzaman Manfred Kerberk Alistair Knott David Kinny Supanat Kitcharoensakul Kevin Korb Victor Korotkich Krishna Kottathra Rex Kwok Henry Kyburg Willem Labuschagne Evelina Lamma Wai Lam Jimmy Lee Jean Lieber Dekang Lin Ho-fung Leung Fangzhen Lin Bruce Litow Wei Liu Phil Long David R Lovell Witold Lukaszewicz Xudong Luo Sofian Maabout Cara MacNish Anna Maclachlan N. Mani Heiko Mantel Xivun Mao Kim Marriott Rvusuke Masuoka Gord McCalla Eric McCreath Ian McDonald Erica Mellis Tim Menzies Nicolas Meuleau Josef Meyer Michela Milano David Morley Fazel Naghdy Ekawit Nantareewarawat Abhava Navak Eric Neufeld Douglas Newlands Ann Nicholson Koichi Niijima Toshihiko Ono Tom Osborn Robyn Owens Maurice Pagnucco Andrew P. Paplinski Cecile Paris Noel Patson Lawrence Peh Pavlos Peppas Y. Permpoontanalarp Mark Peters Tuan Pham Richard Price Daniel Pun Maryam Purvis Cateen Quayle Monzur Rahman Sid Ray Wayne Read Ingrid Rewitzky

Debbie Richards Joseph Ryan Erik Sandewall Helen Shen Hiroshi Shiratsuchi

John Slaney Zbigniew Stachniak

D. Suter Thanaruk

Theeramunkong
Kai Ming Ting
Thilo Trapp
Olivier de Vel
Margaret Wasko
Geoff Webb
Peter Wigham
Graham Wrightson
Wai Kiang Yeap
Soe-Tsyr Yuan
Lynn Zelmer

Mike Rosenman Chiaki Sakama Ken Satoh Uday V. Shenoy Simeon Simoff Liz Sonenberg Nigel Stanger Andrzej Szalas Sylvie Thiebaux Boon Toh Low Andre Trudel Matt Vernoov Nobuo Watanabe Virginia Wheway Mary-Anne Williams Baolin Wu Jia-Huai You Nobuhiro Yugami DongMei Zhang

Zijian Zheng

Hans Rott M. Abdus Salam A. Sattar Sin Shimozono G. Sivakumar Bruce Spencer Geoff Sutcliffe Choh Man Teng John Thornton Francesca Toni C. P. Tsang Steven Versteeg Sam Waugh Lyndon While Andreas Wolf Vilas Wuwongse Xinghuo Yu Alex Zelinsky Weihong Zhang Jackson Zhu