Lecture Notes in Computer Science 5361

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Xiaodong Li Michael Kirley
Mengjie Zhang David Green
Vic Ciesielski Hussein Abbass
Zbigniew Michalewicz Tim Hendtlass
Kalyanmoy Deb Kay Chen Tan
Jürgen Branke Yuhui Shi (Eds.)

Simulated Evolution and Learning

7th International Conference, SEAL 2008
Melbourne, Australia, December 7-10, 2008
Proceedings

Springer

Volume Editors

Xiaodong Li, RMIT University, Melbourne, Australia, xiaodong.li@rmit.edu.au

Michael Kirley, The University of Melbourne, Australia, mkirley@cs.mu.oz.au

Mengjie Zhang
Victoria University of Wellington, New Zealand, mengjie.zhang@mcs.vuw.ac.nz

David Green, Monash University, Australia, David.Green@infotech.monash.edu.au

Vic Ciesielski, RMIT University, Melbourne, Australia, vc@rmit.edu.au

Hussein Abbass
University of New South Wales, Canberra, Australia, h.abbass@adfa.edu.au

Zbigniew Michalewicz, University of Adelaide, Australia, zbyszek@cs.adelaide.edu.au

Tim Hendtlass
Swinburne University of Technology, Melbourne, Australia, thendtlass@swin.edu.au

Kalyanmoy Deb
Indian Institute of Technology Kanpur, Uttar Pradesh, India, deb@iitk.ac.in

Kay Chen Tan, National University of Singapore, eletankc@nus.edu.sg

Jürgen Branke, University of Karlsruhe, Germany, branke@aifb.uni-karlsruhe.de

Yuhui Shi
Xi'an Jiaotong-Liverpool University, Suzhoum, China, yuhui.shi@xjtlu.edu.cn

Library of Congress Control Number: 2008939923

CR Subject Classification (1998): F.1.1, I.2.6, I.6, G.1.6, D.2.2, J.3-4

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN 0302-9743
ISBN-10 3-540-89693-7 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-89693-7 Springer Berlin Heidelberg New York

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12573189 06/3180 5 4 3 2 1 0

Preface

This LNCS volume contains the papers presented at SEAL 2008, the 7th International Conference on Simulated Evolution and Learning, held December 7–10, 2008, in Melbourne, Australia. SEAL is a prestigious international conference series in evolutionary computation and learning. This biennial event was first held in Seoul, Korea, in 1996, and then in Canberra, Australia (1998), Nagoya, Japan (2000), Singapore (2002), Busan, Korea (2004), and Hefei, China (2006).

SEAL 2008 received 140 paper submissions from more than 30 countries. After a rigorous peer-review process involving at least 3 reviews for each paper (i.e., over 420 reviews in total), the best 65 papers were selected to be presented at the conference and included in this volume, resulting in an acceptance rate of about 46%.

The papers included in this volume cover a wide range of topics in simulated evolution and learning: from evolutionary learning to evolutionary optimization, from hybrid systems to adaptive systems, from theoretical issues to real-world applications. They represent some of the latest and best research in simulated evolution and learning in the world.

The conference featured four distinguished keynote speakers: Kalyanmoy Deb, Zbigniew Michalewicz, Xin Yao and Hussein Abbass. Kalyanmoy Deb's talk was on "Reliability-Based Optimization for Handling Uncertainty in Evolutionary Algorithms." Zbigniew Michalewicz's talk was on "The Future of Business Intelligence." Xin Yao's talk was on "Cooperative Coevolution for Large-Scale Evolutionary Optimization," while Hussein Abbass's talk was on "The Future of Intelligent Systems Is Non-Dominance." We were very fortunate to have such internationally renown research leaders giving talks at SEAL 2008, given their busy schedules. Their presence at the conference was yet another indicator of the importance of the SEAL conference series on the international research map.

SEAL 2008 also included five tutorials, which were free to all conference participants. Four tutorials were kindly provided by the four keynote speakers, and in addition, we were also fortunate to have Dipankar Dasgupta present a tutorial of a fascinating topic on "Immunological Computation." These five tutorials covered some of the hottest topics in evolutionary computation and learning and their applications, including "Recent Trends in Evolutionary Multi-Objective Optimization" (Kalyanmoy Deb), "Puzzle-Based Learning" (Zbigniew Michalewicz), "Evolving and Designing Neural Network Ensembles" (Xin Yao), "Getting Evolution to Solve Your Practical Problems" (Hussein Abbass), and "Immunological Computation" (Dipankar Dasgupta). They provided an excellent start to the four-day conference.

The success of a conference depends on its authors, reviewers and organizers. SEAL 2008 was no exception. We are very grateful to all the authors for their paper submissions and to all the Program Committee members for their outstanding

effort in reviewing the papers within a very tight schedule. We relied heavily upon a team of volunteers to keep SEAL 2008 running smoothly and efficiently. They were the true heroes working behind the scene. In particular, Donna-Lee Stanes and Dianne Nguyen from Monash University played an important role in supporting the running of the conference. We are most grateful to all the volunteers for their great efforts and contributions.

We would also like to thank our sponsor for providing all the support and financial assistance, including the ECML group, RMIT University; the Department of Computer Science and Software Engineering, University of Melbourne; School of Information Technology, Monash University; ARC Complex Open Systems Research Network; and the Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development (AFOSR/AOARD).

September 2008

Xiaodong Li
Michael Kirley
Mengjie Zhang
David Green

Organization

The 7th International Conference on Simulated Evolution And Learning (SEAL 2008) was organized and hosted by RMIT University, The University of Melbourne, and Monash University, Melbourne, Australia.

SEAL 2008 Conference Committee

General Chair	Xiaodong Li (Australia)
Program Chairs	Michael Kirley (Australia) Mengjie Zhang (New Zealand) David Green (Australia)
Technical Co-chairs	Vic Ciesielski (Australia) Hussein Abbass (Australia) Zbigniew Michalewicz (Australia) Tim Hendtlass (Australia) Kalyanmoy Deb (India) Kay Chen Tan (Singapore) Jürgen Branke (Germany Yuhui Shi (China)
Tutorials and Special Sessions Chair	Cara MacNish (Australia)
Organizing Committee Co-chairs	Andy Song (Australia) Dianne Nguyen (Australia)
Organizing Committee Members	Upali K. Wickramasinghe, Stefan Bird, Gayan Wijesinghe, Antony Iorio, and Golriz Rezaei

International Advisory Committee

Takeshi Furuhashi	Japan
Jong-Hwan Kim	South Korea
Bob McKay	South Korea
Lipo Wang	Singapore
Xin Yao	UK

SEAL 2008 Tutorials

Recent Trends in Evolutionary Multi-Objective Optimization
Kalyanmoy Deb

Puzzle-Based Learning
Zbigniew Michalewicz

Evolving and Designing Neural Network Ensembles
Xin Yao

Getting Evolution to Solve Your Practical Problems
Hussein Abbass

Immunological Computation
Dipankar Dasgupta

Sponsoring Institutions

Evolutionary Computation and Machine Learning Group (ECML), School of Computer Science and IT, RMIT University

Department of Computer Science and Software Engineering, The University of Melbourne

School of Information Technology, Monash University

ARC Complex Open Systems Research Network

Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development (AFOSR/AOARD)

Acknowledgements

We wish to thank the Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development (AFOSR/AOARD), for their contribution to the success of this conference.

Disclaimer: AFOSR/AOARD support is not intended to express or imply endorsement by the U.S. Federal Government.

Program Committee

Hussein Abbass
Hernan Aguirre
Dan Angus
Luigi Barone
Bir Bhanu
Stefan Bird
Jürgen Branke
Lam Bui
Stefano Cagnoni
Jinhai Cai
Zhenjiang Cai
Ying-ping Chen
Yi-Yuan Chiang
Raymond Chiong
Siang Yew Chong
Vic Ciesielski
Maurice Clerc
Peter Cowling
Kalyanmoy Deb
Hepu Deng
Grant Dick
Marc Ebner
Daryl Essam
David Green
Gary Greenfield
Steven Gustafson
Hisashi Handa
Jingsong He
Tim Hendtlass
Samuelson W. Hong
Daniel Howard
Antony Iorio
Hisao Ishibuchi
David Jackson
Licheng Jiao
Mark Johnston
Gul Muhammad Khan
Michael Kirley
Tomas Klos
Mario Koeppen
Krzysztof Krawiec
Saku Kukkonen
Robert K. Lai
Per Kristian Lehre
Jinyan Li
Jin Li
Wei Li
Bin Li
Xiaodong Li
Jing Liu
Wenjian Luo
Cara MacNish
Jon McCormack
Kathryn Merrick
Bernd Meyer
Ammar Mohemmed
Irene Moser
Kourosh Neshatian
David Newth
Gustavo Olague
Yew Soon Ong
Angel Perez-Bellido
Lukas Pichl
Kai Qin
Han Yang Quek
Marcus Randall
Jani Rönkkönen
Ramón Sagarna
Sancho Salcedo-Sanz
Muhammad Sarfraz
Ruhul Sarker
Zhongzhi Shi
Yuhui Shi
Josefina Sierra
Hiroshi Someya
Qing Song
Andy Song
Kay Chen Tan
Ke Tang
Krzysztof Trojanowski
Peter Vamplew
Yu-Xuan Wang
Dianhui Wang
Peter Whigham
Upali K. Wickramasinghe
Clinton Woodward
Jason Xie
Feng Xue
Shengxiang Yang
Tina Yu
Lean Yu
Mengjie Zhang
Shichao Zhang
Qingfu Zhang
Jun Zhang
Shude Zhou
Zhihua Zhou

Table of Contents

Evolutionary Learning

Evolutionary Optimisation

Hybrid Learning

Adaptive Systems

Theoretical Issues in Evolutionary Computation

Real-World Applications of Evolutionary Computation Techniques