


Commenced Publication in 1973

View metadata, citation and similar papers at core.ac.uk

brought to you by  **CORE**

provided by De Montfort University Open Research Archive

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Mario Giacobini et al. (Eds.)

Applications of Evolutionary Computing

EvoWorkshops 2007: EvoCOMNET, EvoFIN, EvoIASP,
EvoINTERACTION, EvoMUSART, EvoSTOC and EvoTRANSLOG
Valencia, Spain, April 11-13, 2007
Proceedings

Volume Editors

see next page

Cover illustration: Morphogenesis series #12 by Jon McCormack, 2006

Library of Congress Control Number: 2007923848

CR Subject Classification (1998): F.1, D.1, B, C.2, J.3, I.4, J.5

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

ISSN 0302-9743

ISBN-10 3-540-71804-4 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-71804-8 Springer 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. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2007

Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper SPIN: 12044283 06/3180 5 4 3 2 1 0

Volume Editors

Mario Giacobini
Dept. of Animal Production,
Epidemiology and Ecology
University of Torino, Italy
mario.giacobini@unito.it

Anthony Brabazon
School of Business
University College Dublin, Ireland
anthony.brabazon@ucd.ie

Stefano Cagnoni
Dept. of Computer Engineering
University of Parma, Italy
cagnoni@ce.unipr.it

Gianni A. Di Caro
IDSIA, Switzerland
gianni@idsia.ch

Rolf Drechsler
Institute of Computer Science
University of Bremen, Germany
drechsle@informatik.uni-bremen.de

Muddassar Farooq
Center for Advanced Studies in
Engineering, Pakistan
muddassar.farooq@case.edu.pk

Andreas Fink
Fac. of Economics & Social Sciences
Helmut-Schmidt-University
Hamburg, Germany
andreas.fink@hsu-hamburg.de

Evelyne Lutton
INRIA Rocquencourt, France
Evelyne.Lutton@inria.fr

Penousal Machado
Dept. of Informatics Engineering
University of Coimbra, Portugal
machado@dei.uc.pt

Stefan Minner
Dept. of Logistics
University of Mannheim, Germany
minner@bwl.uni-mannheim.de

Michael O'Neill
School of Computer Science and
Informatics
University College Dublin, Ireland
m.oneill@ucd.ie

Juan Romero
Facultad de Informatica
University of A Coruña, Spain
jj@udc.es

Franz Rothlauf
Dept. of Information Systems
Johannes Gutenberg University
Mainz, Germany
rothlauf@uni-mainz.de

Giovanni Squillero
Dip. di Automatica e Informatica
Politecnico di Torino, Italy
giovanni.squillero@polito.it

Hideyuki Takagi
Faculty of Design
Kyushu University, Japan
takagi@design.kyushu-u.ac.jp

A. Şima Uyar
Dept. of Computer Engineering
Istanbul Technical University, Turkey
etaner@cs.itu.edu.tr

Shengxiang Yang
Dept. of Computer Science
University of Leicester, UK
s.yang@mcs.le.ac.uk

Preface

Evolutionary computation (EC) techniques are efficient nature-inspired planning and optimization methods based on the principles of natural evolution and genetics. Due to their efficiency and simple underlying principles, these methods can be used in the context of problem solving, optimization, and machine learning. A large and continuously increasing number of researchers and professionals make use of EC techniques in various application domains. This volume presents a careful selection of relevant EC examples combined with a thorough examination of the techniques used in EC. These papers illustrate the current state of the art in the application of EC and should help and inspire researchers and professionals to develop efficient EC methods for design and problem solving.

All papers in this book were presented during EvoWorkshops 2007, which was a varying collection of workshops on application-oriented aspects of EC. The year 2007 was especially important for EvoWorkshops, which celebrated their tenth edition. In fact, since 1998, EvoWorkshops has provided a unique opportunity for EC researchers to meet and discuss application aspects of EC and it has been an important link between EC research and its application in a variety of domains. During these ten years, new workshops have arisen, some have disappeared, while others have matured to become conferences of their own, such as EuroGP in 2000, EvoCOP in 2004, and EvoBIO in 2007.

Another fundamental novelty in 2007 was the creation of EVO*, Europe's premier co-located events in the field of evolutionary computing, unifying EuroGP, the main European event dedicated to genetic programming, EvoCOP, the main European conference on evolutionary computation in combinatorial optimization, EvoBIO, the first European conference on EC and related techniques in bioinformatics and computational biology, and EvoWorkshops. The proceedings for all of these events, EuroGP 2007, EvoCOP 2007 and EvoBIO 2007, are also available in the LNCS series (number 4445, 4446, and 4447). EVO* was held in Valencia, Spain, during April 11–13, 2007, jointly with the conferences EuroGP 2007, EvoCOP 2007, and EvoBIO 2007.

EvoWorkshops 2007 consisted of the following individual workshops:

- *EvoCOMNET*, the Fourth European Workshop on the Application of Nature-Inspired Techniques to Telecommunication Networks and Other Connected Systems
- *EvoFIN*, the 1st European Workshop on Evolutionary Computation in Finance and Economics
- *EvoIASP*, the Ninth European Workshop on Evolutionary Computation in Image Analysis and Signal Processing
- *EvoInteraction*, the 2nd European Workshop on Interactive Evolution and Humanized Computational Intelligence

- *EvoMUSART*, the Fifth European Workshop on Evolutionary Music and Art
- *EvoSTOC*, the Fourth European Workshop on Evolutionary Algorithms in Stochastic and Dynamic Environments
- *EvoTransLog*, the 1st European Workshop on Evolutionary Computation in Transportation and Logistics

EvoCOMNET addresses the application of EC techniques to problems in communications, networks, and connected systems. New communication technologies, the creation of interconnected communication and information networks such as the Internet, new types of interpersonal and interorganizational communication, and the integration and interconnection of production centers and industries are the driving forces on the road towards a connected, networked society. EC techniques are important tools to be able to face these challenges.

EvoFIN is the first European event specifically dedicated to the applications of EC and related natural computing methodologies, to finance and economics. Financial environments are typically hard, being dynamic, high-dimensional, noisy and co-evolutionary. These environments serve as an interesting test bed for novel evolutionary methodologies. The papers for this year's workshop encompassed several key topics in finance including portfolio optimization, time series forecasting, risk management, failure prediction, agent behavior, and options pricing.

EvoIASP, the longest-running of all EvoWorkshops which reached its ninth edition in 2007, has been the first international event solely dedicated to the applications of EC to image analysis and signal processing in complex domains of high industrial and social relevance.

EvoInteraction deals with various aspects of interactive evolution, and more broadly of computational intelligence in interaction with human intelligence, including methodology, theoretical issues, and new applications. Interaction with humans raises several problems, mainly linked to what has been called the user bottleneck, i.e., human fatigue.

EvoMUSART focuses on the use of EC techniques for the development of creative systems. There is a growing interest in the application of these techniques in fields such as art, music, architecture, and design. The goal of EvoMUSART is to bring together researchers that use EC in this context, providing an opportunity to promote, present, and discuss the latest work in the area, fostering its further developments and collaboration among researchers.

EvoSTOC addresses the application of EC in stochastic environments. This includes optimization problems with changing, noisy, and/or approximated fitness functions and optimization problems that require robust solutions. These topics recently gained increasing attention in the EC community and EvoSTOC was the first workshop that provided a platform to present and discuss the latest research in this field.

EvoTransLog deals with all aspects of the use of evolutionary computation, local search and other nature-inspired optimization and design techniques for the transportation and logistics domain. The impact of transportation and logistics

on the modern economy and society has been growing steadily over the last few decades. Along with the development of more powerful computer systems, design and optimization techniques such as evolutionary computing approaches have been developed allowing one to use computer systems for systematic design, optimization, and improvement of systems in the transportation and logistics domain.

EvoWorkshops 2007 continued the tradition of providing researchers, as well as people from industry, students, and interested newcomers, with an opportunity to present new results, discuss current developments and applications, or simply become acquainted with the world of EC. Moreover, it encourages and reinforces future possible synergies and interactions between members of all scientific communities that may benefit from EC techniques.

This year, the EvoWorkshops had the highest number of submissions ever, cumulating at 160 entries (with respect to 143 in 2005 and 149 in 2006). EvoWorkshops 2007 accepted ten-page full papers and eight-page short papers. Full papers were presented orally over the three conference days, while short papers were presented and discussed during a special poster session. The low acceptance rate of 34.37% for EvoWorkshops 2007, the lowest of all past editions, along with the significant and still-growing number of submissions is an indicator of the high quality of the articles presented at the workshops, showing the liveliness of the scientific movement in the corresponding fields. The following table shows relevant statistics for EvoWorkshops 2006 and EvoWorkshops 2007 (accepted short papers are in brackets):

Year	2007			2006		
	Submissions	Accept	Ratio	Submissions	Accept	Ratio
EvoCOMNET	44	11(7)	25%	16	5	31.2%
EvoFIN	13	6(2)	46.15%	-	-	-
EvoIASP	35	11(10)	31.43%	35	12(7)	34.3%
EvoInteraction	7	4	57.14%	8	6	75%
EvoMUSART	30	10(5)	33.33%	29	10(4)	34.5%
EvoSTOC	11	5	45.45%	12	6(2)	50.0%
EvoTransLog	20	8	40%	-	-	-
Total	160	55(24)	34.37%	149	65(13)	43.6%

We would like to thank the following institutions:

- The Universidad Politécnica de Valencia, for its institutional and financial support and for providing premises and administrative assistance
- The Instituto Tecnológico de Informatica in Valencia, for cooperation and help with local arrangements
- The Spanish Ministerio de Educación y Ciencia, for their financial contribution
- The Centre for Emergent Computing at Napier University in Edinburgh, Scotland, for administrative help and event coordination

Even with an excellent support and location, an event like EVO* would not have been feasible without authors submitting their work, members of the Program Committees dedicating energy in reviewing those papers, and an audience. All these people deserve our gratitude.

Finally, we are grateful to all those involved in the preparation of the event, especially Jennifer Willies for her unaltered dedication to the coordination of the event over the years. Without her support, running such a type of conference with a large number of different organizers and different opinions would be unmanageable. Further thanks to the local organizer Anna I. Esparcia-Alcázar, Ken Sharman, and the Complex Adaptive Systems group of the Instituto Tecnológico de Informática for making the organization of such an event possible in a place as unique as Valencia. Last but surely not least, we want to especially acknowledge Leonardo Vanneschi for his hard work as Publicity Chair of the event, and Marc Schoenauer for his continuous help in setting up and maintaining the conference portal.

April 2007	Mario Giacobini	Anthony Brabazon	Stefano Cagnoni
	Gianni A. Di Caro	Rolf Drechsler	Muddassar Farooq
	Andreas Fink	Evelyne Lutton	Penousal Machado
	Stefan Minner	Michael O'Neill	Juan Romero
	Franz Rothlauf	Giovanni Squillero	Hideyuki Takagi
	A. Şima Uyar	Shengxiang Yang	

Organization

EvoWorkshops 2007 was part of EVO* 2007, Europe's premier co-located events in the field of evolutionary computing, that also included the conferences EuroGP 2007, EvoCOP 2007, and EvoBIO 2007.

Organizing Committee

EvoWorkshops Chair	Mario Giacobini, University of Torino, Italy
Local Chair	Anna Isabel Esparcia-Alcazar, Universidad Politécnica de Valencia, Spain
Publicity Chair	Leonardo Vanneschi, University of Milano Bicocca, Italy
EvoCOMNET Co-chairs	Muddassar Farooq, Center for Advanced Studies in Engineering, Pakistan Gianni A. Di Caro, IDSIA, Switzerland
EvoFIN Co-chairs	Anthony Brabazon, University College Dublin, Ireland Michael O'Neill, University College Dublin, Ireland
EvoIASP Chair	Stefano Cagnoni, University of Parma, Italy
EvoInteraction Co-chairs	Evelyne Lutton, INRIA, France Hideyuki Takagi, Kyushu University, Japan
EvoMUSART Co-chairs	Juan Romero, University of A Coruña, Spain, Penousal Machado, University of Coimbra, Portugal
EvoSTOC Co-chairs	A. Şima Uyar, Istanbul Technical University, Turkey Shengxiang Yang, University of Leicester, UK
EvoTransLog Co-chairs	Andreas Fink, Helmut-Schmidt-University Hamburg, Germany Stefan Minner, University of Mannheim, Germany Franz Rothlauf, Johannes Gutenberg University Mainz, Germany

Program Committees

EvoCOMNET Program Committee

Payman Arabshahi, University of Washington, USA
Eric Bonabeau, Icosystem Corp., USA
Frederick Ducatelle, IDSIA, Switzerland
Luca M. Gambardella, IDSIA, Switzerland

Jin-Kao Hao, University of Angers, France
Marc Heissenbuettel, Swisscom Mobile Ltd., Switzerland
Malcolm I. Heywood, Dalhousie University, Canada
Nur Zincir-Heywood, Dalhousie University, Canada
Bryant Julstrom, St. Cloud State University, USA
Vittorio Maniezzo, University of Bologna, Italy
Alcherio Martinoli, EPFL, Switzerland
José Luis Marzo, University of Girona, Spain
Ronaldo Menezes, Florida Tech., USA
Roberto Montemanni, IDSIA, Switzerland
Martin Roth, Deutsche Telekom Ltd., Germany
Leon Rothkrantz, Delft University of Technology, The Netherlands
Chien-Chung Shen, University of Delaware, USA
Kwang M. Sim, Hong Kong Baptist University, Hong Kong
Mark C. Sinclair, Royal University of Phnom Penh, Cambodia
George D. Smith, University of East Anglia, UK
Christian Tschudin, University of Basel, Switzerland
Yong Xu, University of Birmingham, UK
Lidia Yamamoto, University of Basel, Switzerland
Franco Zambonelli, University of Modena and Reggio Emilia, Italy

EvoFIN Program Committee

Ernesto Costa, University of Coimbra, Portugal
Carlos Cotta, University of Málaga, Spain
Ian Dempsey, Pipeline Trading, USA
David Edelman, University College Dublin, Ireland
Philip Hamill, Queen's University Belfast, Ireland
Dietmar Maringer, University of Essex, UK
Robert Schaefer, AGH University of Science and Technology, Poland
Chris Stephens, Universidad Nacional Autonoma de Mexico, Mexico
Ruppa K. Thulasiram, University of Manitoba, Canada

EvoIASP Program Committee

Lucia Ballerini, European Center for Soft Computing, Spain
Bir Bhanu, University of California at Riverside, USA
Leonardo Bocchi, University of Florence, Italy
Alberto Broggi, University of Parma, Italy
Stefano Cagnoni, University of Parma, Italy
Ela Claridge, University of Birmingham, UK
Oscar Cordon, European Center for Soft Computing, Spain
Laura Dipietro, Massachusetts Institute of Technology, USA
Marc Ebner, University of Würzburg, Germany
Daniel Howard, Qinetiq, UK
Mario Koeppen, FhG IPK Berlin, Germany
Evelyne Lutton, INRIA, France

Gustavo Olague, CICESE, Mexico
 Riccardo Poli, University of Essex, UK
 Stephen Smith, University of York, UK
 Giovanni Squillero, Politecnico di Torino, Italy
 Kiyoshi Tanaka, Shinshu University, Japan
 Ankur M. Teredesai, Rochester Institute of Technology, USA
 Andy Tyrrell, University of York, UK
 Leonardo Vanneschi, University of Milano-Bicocca, Italy
 Robert Vanyi, Siemens PSE, Hungary
 Mengjie Zhang, Victoria University of Wellington, New Zealand

EvoInteraction Program Committee

Eric Bonabeau, Icosystem, USA
 Praminda Caleb-Solly, University of the West of England, UK
 Pierre Collet, Université du Littoral, Calais, France
 Fang-Cheng Hsu, Aletheia University, Republic of China
 Christian Jacob, University of Calgary, USA
 Daisuke Katagami, Tokyo Institute of Technology, Japan
 Penousal Machado, University of Coimbra, Portugal
 Yoichiro Maeda, University of Fukui, Japan
 Nicolas Monmarche, Université de Tours, France
 Hiroaki Nishino, Oita University, Japan
 Ian C. Parmee, University of the West of England, UK
 Yago Saez, Universidad Carlos III de Madrid, Spain
 Marc Schoenauer, INRIA, France
 Daniel Thalmann, EPFL, Switzerland
 Leuo-Hong Wang, Aletheia University, Republic of China

EvoMUSART Program Committee

Peter Bentley, University College London, UK
 Eleonora Bilotta, University of Calabria, Italy
 Tim Blackwell, University of London, UK
 Tony Brooks, Aalborg University, Denmark
 Paul Brown, University of Sussex, UK
 Larry Bull, University of the West of England, UK
 Stefano Cagnoni, University of Parma, Italy
 Francisco Camara Pereira, University of Coimbra, Portugal
 Gianfranco Campolongo, University of Calabria, Italy
 Amilcar Cardoso, University of Coimbra, Portugal
 John Collomosse, University of Bath, UK
 Alan Dorin, Monash University, Australia
 Scott Draves, San Francisco, USA
 Charlie D. Frowd, University of Stirling, UK
 Andrew Gildfind, Royal Melbourne Institute of Technology, Australia
 Maria Goga, University of Bucharest, Romania

Nicolae Goga, University of Groningen, The Netherlands
Gary Greenfield, University of Richmond, USA
Carlos Grilo, School of Technology and Management of Leiria, Portugal
Martin Hemberg, Imperial College London, UK
Andrew Horner, University of Science and Technology, Hong Kong
Christian Jacob, University of Calgary, Canada
Janis Jefferies, Goldsmiths College, University of London, UK
Colin Johnson, University of Kent, UK
Francois-Joseph Lapointe, University of Montreal, Canada
William Latham, Art Games Ltd, UK
Matthew Lewis, Ohio State University, USA
Evelyne Lutton, INRIA, France
Bill Manaris, College of Charleston, USA
Ruli Manurung, University of Indonesia, Indonesia
Joao Martins, University of Plymouth, UK
Jon McCormack, Monash University, Australia
James McDermott, University of Limerick, UK
Eduardo R. Miranda, University of Plymouth, UK
Nicolas Monmarché, University of Tours, France
Gary Lee Nelson, Oberlin College, USA
Luigi Pagliarini, Pescara Electronic Artists Meeting, Italy and University of
Southern Denmark, Denmark
Pietro Pantano, University of Calabria, Italy
Alejandro Pazos, University of A Coruña, Spain
Rafael Ramirez, Pompeu Fabra University, Spain
Brian J. Ross, Brock University, Canada
Artemis Sanchez Moroni, Renato Archer Research Center, Brazil
Antonino Santos, University of A Coruña, Spain
Jorge Tavares, University of Coimbra, Portugal
Peter Todd, Max Planck Institute for Human Development, Germany
Stephen Todd, IBM, UK
Paulo Urbano, Universidade de Lisboa, Portugal
Jeffrey Ventrella, Independent Artist, USA
Rodney Waschka II, North Carolina State University, USA
Gerhard Widmer, Johannes Kepler University Linz, Austria

EvoSTOC Program Committee

Dirk Arnold, Dalhousie University, Canada
Hans-Georg Beyer, Vorarlberg University of Applied Sciences, Austria
Tim Blackwell, Goldsmiths College, UK
Juergen Branke, University of Karlsruhe, Germany
Ernesto Costa, University of Coimbra, Portugal
Yaochu Jin, Honda Research Institute, Germany
Stephan Meisel, Technical University Braunschweig, Germany
Daniel Merkle, University of Leipzig, Germany

Zbigniew Michalewicz, University of Adelaide, Australia
 Martin Middendorf, University of Leipzig, Germany
 Ron Morrison, Mitretek Systems, USA
 Ferrante Neri, University of Technology of Bari, Italy
 Yew Soon Ong, Nanyang Technological University, Singapore
 William Rand, Northwestern University, USA
 Hendrik Richter, University of Leipzig, Germany
 Kumara Sastry, University of Illinois at Urbana Champaign, USA
 Ken Sharman, Universidad Politécnica de Valencia, Spain
 Anabela Simões, University of Coimbra, Portugal
 Christian Schmidt, University of Karlsruhe, Germany

EvoTransLog Program Committee

Christian Bierwirth, University of Halle-Wittenberg, Germany
 Karl Doerner, University of Vienna, Austria
 Martin J. Geiger, University of Hohenheim, Germany
 Jens Gottlieb, SAP, Germany
 Jörg Homberger, University of Applied Sciences Kaiserslautern, Germany
 Hoong Chuin Lau, Singapore Management University, Singapore
 Dirk C. Mattfeld, University of Technology Braunschweig, Germany
 Giselher Pankratz, Distance University Hagen, Germany
 Christian Prins, Université de Technologie de Troyes, France
 Agachai Sumalee, University of Leeds, UK
 Theodore Tsekeris, National Technical University of Athens, Greece
 Stefan Voss, University of Hamburg, Germany

Sponsoring Institutions

- Universidad Politécnica de Valencia, Spain
- Instituto Tecnológico de Informática in Valencia, Spain
- Ministerio de Educación y Ciencia, Spain
- The Centre for Emergent Computing at Napier University in Edinburgh, UK

Table of Contents

EvoCOMNET Contributions

Performance of Ant Routing Algorithms When Using TCP	1
<i>Malgorzata Gadomska and Andrzej Pacut</i>	
Evolving Buffer Overflow Attacks with Detector Feedback	11
<i>H. Gunes Kayacik, Malcolm Iain Heywood, and A. Nur Zincir-Heywood</i>	
Genetic Representations for Evolutionary Minimization of Network Coding Resources	21
<i>Minkyu Kim, Varun Aggarwal, Una-May O'Reilly, Muriel Médard, and Wonsik Kim</i>	
Bacterial Foraging Algorithm with Varying Population for Optimal Power Flow	32
<i>M.S. Li, W.J. Tang, W.H. Tang, Q.H. Wu, and J.R. Saunders</i>	
An Ant Algorithm for the Steiner Tree Problem in Graphs	42
<i>Luc Luyet, Sacha Varone, and Nicolas Zufferey</i>	
Message Authentication Protocol Based on Cellular Automata	52
<i>Angel Martín del Rey</i>	
An Adaptive Global-Local Memetic Algorithm to Discover Resources in P2P Networks	61
<i>Ferrante Neri, Niko Kotilainen, and Mikko Vapa</i>	
Evolutionary Computation for Quality of Service Internet Routing Optimization	71
<i>Miguel Rocha, Pedro Sousa, Paulo Cortez, and Miguel Rio</i>	
BeeSensor: A Bee-Inspired Power Aware Routing Protocol for Wireless Sensor Networks	81
<i>Muhammad Saleem and Muddassar Farooq</i>	
Radio Network Design Using Population-Based Incremental Learning and Grid Computing with BOINC	91
<i>Miguel A. Vega-Rodríguez, David Vega-Pérez, Juan A. Gómez-Pulido, and Juan M. Sánchez-Pérez</i>	
Evaluation of Different Metaheuristics Solving the RND Problem	101
<i>Miguel A. Vega-Rodríguez, Juan A. Gómez-Pulido, Enrique Alba, David Vega-Pérez, Silvio Priem-Mendes, and Guillermo Molina</i>	

A Comparative Investigation on Heuristic Optimization of WCDMA Radio Networks	111
<i>Mehmet E. Aydin, Jun Yang, and Jie Zhang</i>	
Design of a User Space Software Suite for Probabilistic Routing in Ad-Hoc Networks	121
<i>Frederick Ducatelle, Martin Roth, and Luca Maria Gambardella</i>	
Empirical Validation of a Gossiping Communication Mechanism for Parallel EAs	129
<i>Juan Luís Jiménez Laredo, Pedro Angel Castillo, Ben Paechter, Antonio Miguel Mora, Eva Alfaro-Cid, Anna I. Esparcia-Alcázar, and Juan Julián Merelo</i>	
A Transport-Layer Based Simultaneous Access Scheme in Integrated WLAN/UMTS Mobile Networks	137
<i>Hyung-Taig Lim, Seung-Joon Seok, and Chul-Hee Kang</i>	
Simplified Transformer Winding Modelling and Parameter Identification Using Particle Swarm Optimiser with Passive Congregation	145
<i>Almas Shintemirov, W.H. Tang, Z. Lu, and Q.H. Wu</i>	
A Decentralized Hierarchical Aggregation Scheme Using Fermat Points in Wireless Sensor Networks	153
<i>Jeongho Son, Jinsuk Pak, Hyunsook Kim, and Kijun Han</i>	
A Gateway Access-Point Selection Problem and Traffic Balancing in Wireless Mesh Networks	161
<i>Ahmet Cagatay Talay</i>	

EvoFIN Contributions

A Genetic Programming Approach for Bankruptcy Prediction Using a Highly Unbalanced Database	169
<i>Eva Alfaro-Cid, Ken Sharman, and Anna I. Esparcia-Alcázar</i>	
Multi-objective Optimization Technique Based on Co-evolutionary Interactions in Multi-agent System	179
<i>Rafał Dreżewski and Leszek Siwik</i>	
Quantum-Inspired Evolutionary Algorithms for Calibration of the VG Option Pricing Model	189
<i>Kai Fan, Anthony Brabazon, Conall O'Sullivan, and Michael O'Neill</i>	
An Evolutionary Computation Approach to Scenario-Based Risk-Return Portfolio Optimization for General Risk Measures	199
<i>Ronald Hochreiter</i>	

Building Risk-Optimal Portfolio Using Evolutionary Strategies	208
<i>Piotr Lipinski, Katarzyna Winczura, and Joanna Wojcik</i>	
Comparison of Evolutionary Techniques for Value-at-Risk Calculation	218
<i>Gonul Uludag, A. Şima Uyar, Kerem Senel, and Hasan Dag</i>	
Using Kalman-Filtered Radial Basis Function Networks to Forecast Changes in the ISEQ Index	228
<i>David Edelman</i>	
Business Intelligence for Strategic Marketing: Predictive Modelling of Customer Behaviour Using Fuzzy Logic and Evolutionary Algorithms	233
<i>Andrea G.B. Tettamanzi, Maria Carlesi, Lucia Pannese, and Mauro Santalmasi</i>	

EvoIASP Contributions

Particle Swarm Optimization for Object Detection and Segmentation . . .	241
<i>Stefano Cagnoni, Monica Mordonini, and Jonathan Sartori</i>	
Satellite Image Registration by Distributed Differential Evolution	251
<i>Ivanoe De Falco, Antonio Della Cioppa, Domenico Maisto, Umberto Scafuri, and Ernesto Tarantino</i>	
Harmonic Estimation Using a Global Search Optimiser	261
<i>Y.N. Fei, Z. Lu, W.H. Tang, and Q.H. Wu</i>	
An Online EHW Pattern Recognition System Applied to Face Image Recognition	271
<i>Kyrre Glette, Jim Torresen, and Moritoshi Yasunaga</i>	
Learning and Recognition of Hand-Drawn Shapes Using Generative Genetic Programming	281
<i>Wojciech Jaśkowski, Krzysztof Krawiec, and Bartosz Wieloch</i>	
Multiclass Object Recognition Based on Texture Linear Genetic Programming	291
<i>Gustavo Olague, Eva Romero, Leonardo Trujillo, and Bir Bhanu</i>	
Evolutionary Brain Computer Interfaces	301
<i>Riccardo Poli, Caterina Cinel, Luca Citi, and Francisco Sepulveda</i>	
A Genetic Programming Approach to Feature Selection and Classification of Instantaneous Cognitive States	311
<i>Rafael Ramirez and Montserrat Puiggros</i>	

A Memetic Differential Evolution in Filter Design for Defect Detection in Paper Production	320
<i>Ville Tirronen, Ferrante Neri, Tommi Karkkainen, Kirsi Majava, and Tuomo Rossi</i>	
Optimal Triangulation in 3D Computer Vision Using a Multi-objective Evolutionary Algorithm	330
<i>Israel Vite-Silva, Nareli Cruz-Cortés, Gregorio Toscano-Pulido, and Luis Gerardo de la Fraga</i>	
Genetic Programming for Image Recognition: An LGP Approach	340
<i>Mengjie Zhang and Christopher Graeme Fogelberg</i>	
Evolving Texture Features by Genetic Programming	351
<i>Melanie Aurnhammer</i>	
Euclidean Distance Fit of Ellipses with a Genetic Algorithm	359
<i>Luis Gerardo de la Fraga, Israel Vite Silva, and Nareli Cruz-Cortés</i>	
A Particle Swarm Optimizer Applied to Soft Morphological Filters for Periodic Noise Reduction	367
<i>T.Y. Ji, Z. Lu, and Q.H. Wu</i>	
Fast Genetic Scan Matching Using Corresponding Point Measurements in Mobile Robotics	375
<i>Kristijan Lenac, Enzo Mumolo, and Massimiliano Nolic</i>	
Overcompressing JPEG Images with Evolution Algorithms	383
<i>Jacques Lévy Véhel, Franklin Mendivil, and Evelynne Lutton</i>	
Towards Dynamic Fitness Based Partitioning for IntraVascular UltraSound Image Analysis	391
<i>Rui Li, Jeroen Eggermont, Michael T.M. Emmerich, Ernst G.P. Bovenkamp, Thomas Bäck, Jouke Dijkstra, and Johan H.C. Reiber</i>	
Comparison Between Genetic Algorithms and the Baum-Welch Algorithm in Learning HMMs for Human Activity Classification	399
<i>Óscar Pérez, Massimo Piccardi, Jesús García, Miguel Ángel Patricio, and José Manuel Molina</i>	
Unsupervised Evolutionary Segmentation Algorithm Based on Texture Analysis	407
<i>Cynthia Beatriz Pérez and Gustavo Olague</i>	
Evolutionary Approaches for Automatic 3D Modeling of Skulls in Forensic Identification	415
<i>Jose Santamaría, Oscar Cordon, and Sergio Damas</i>	

Scale Invariance for Evolved Interest Operators	423
<i>Leonardo Trujillo and Gustavo Olague</i>	
Application of the Univariate Marginal Distribution Algorithm to Mixed Analogue - Digital Circuit Design and Optimisation	431
<i>Lyudmila Zinchenko, Matthias Radecker, and Fabio Bisogno</i>	

EvoINTERACTION Contributions

Interactive Texture Design Using IEC Framework	439
<i>Tsuneo Kagawa, Yukihide Tamotsu, Hiroaki Nishino, and Kowichi Utsumiya</i>	
Towards an Interactive, Generative Design System: Integrating a ‘Build and Evolve’ Approach with Machine Learning for Complex Freeform Design	449
<i>Azahar T. Machwe and Ian C. Parmee</i>	
An Interactive Graphics Rendering Optimizer Based on Immune Algorithm	459
<i>Hiroaki Nishino, Takuya Sueyoshi, Tsuneo Kagawa, and Kowichi Utsumiya</i>	
Human Mosaic Creation Through Agents and Interactive Genetic Algorithms Applied to Videogames Movements	470
<i>Oscar Sanjuán, Gloria García, Yago Sáez, and Cristobal Luque</i>	

EvoMUSART Contributions

Self-organizing Bio-inspired Sound Transformation	477
<i>Marcelo Caetano, Jônatas Manzolli, and Fernando Von Zuben</i>	
An Evolutionary Approach to Computer-Aided Orchestration	488
<i>Grégoire Carpentier, Damien Tardieu, Gérard Assayag, Xavier Rodet, and Emmanuel Saint-James</i>	
Evolution of Animated Photomosaics	498
<i>Vic Ciesielski, Marsha Berry, Karen Trist, and Daryl D’Souza</i>	
Environments for Sonic Ecologies	508
<i>Tom Davis and Pedro Rebelo</i>	
Creating Soundscapes Using Evolutionary Spatial Control	517
<i>José Fornari, Adolfo Maia Jr., and Jônatas Manzolli</i>	
Toward Greater Artistic Control for Interactive Evolution of Images and Animation	527
<i>David A. Hart</i>	

Evolutionary Assistance in Alliteration and Allelic Drivel	537
<i>Raquel Hervás, Jason Robinson, and Pablo Gervás</i>	
Evolutionary GUIs for Sound Synthesis	547
<i>James McDermott, Niall J.L. Griffith, and Michael O'Neill</i>	
Evolving Music Generation with SOM-Fitness Genetic Programming . . .	557
<i>Somnuk Phon-Amnuaisuk, Edwin Hui Hean Law, and Ho Chin Kuan</i>	
An Automated Music Improviser Using a Genetic Algorithm Driven Synthesis Engine	567
<i>Matthew John Yee-King</i>	
Interactive GP with Tree Representation of Classical Music Pieces	577
<i>Daichi Ando, Palle Dahlsted, Mats G. Nordahl, and Hitoshi Iba</i>	
Evolutionary Methods for Melodic Sequences Generation from Non-linear Dynamic Systems	585
<i>Eleonora Bilotta, Pietro Pantano, Enrico Cupellini, and Costantino Rizzuti</i>	
Music Composition Using Harmony Search Algorithm	593
<i>Zong Woo Geem and Jeong-Yoon Choi</i>	
Curve, Draft, and Style: Three Steps to the Image	601
<i>Olgierd Unold and Maciej Troc</i>	
GISMO2: An Application for Agent-Based Composition	609
<i>Yuta Uozumi</i>	

EvoSTOC Contributions

Variable-Size Memory Evolutionary Algorithm to Deal with Dynamic Environments	617
<i>Anabela Simões and Ernesto Costa</i>	
Genetic Algorithms with Elitism-Based Immigrants for Changing Optimization Problems	627
<i>Shengxiang Yang</i>	
Triggered Memory-Based Swarm Optimization in Dynamic Environments	637
<i>Hongfeng Wang, Dingwei Wang, and Shengxiang Yang</i>	
Experimental Comparison of Replacement Strategies in Steady State Genetic Algorithms for the Dynamic MKP	647
<i>A. Şima Uyar</i>	

Understanding the Semantics of the Genetic Algorithm in Dynamic Environments	657
<i>Abir Alharbi, William Rand, and Rick Riolo</i>	

EvoTRANSLOG Contributions

Simultaneous Origin-Destination Matrix Estimation in Dynamic Traffic Networks with Evolutionary Computing	668
<i>Theodore Tsekeris, Loukas Dimitriou, and Antony Stathopoulos</i>	
Evolutionary Combinatorial Programming for Discrete Road Network Design with Reliability Requirements	678
<i>Loukas Dimitriou, Theodore Tsekeris, and Antony Stathopoulos</i>	
Intelligent Traffic Control Decision Support System	688
<i>Khaled Almejalli, Keshav Dahal, and M. Alamgir Hossain</i>	
An Ant-Based Heuristic for the Railway Traveling Salesman Problem	702
<i>Petrica C. Pop, Camelia M. Pintea, and Corina Pop Sitar</i>	
Enhancing a MOACO for Solving the Bi-criteria Pathfinding Problem for a Military Unit in a Realistic Battlefield	712
<i>Antonio Miguel Mora, Juan Julian Merele, Cristian Millan, Juan Torrecillas, Juan Luis Jiménez Laredo, and Pedro A. Castillo</i>	
GRASP with Path Relinking for the Capacitated Arc Routing Problem with Time Windows	722
<i>Mohamed Reghioui, Christian Prins, and Nacima Labadi</i>	
Multi-objective Supply Chain Optimization: An Industrial Case Study	732
<i>Lionel Amodeo, Haoxun Chen, and Aboubacar El Hadji</i>	
Scheduling a Fuzzy Flowshop Problem with Flexible Due Dates Using Ant Colony Optimization	742
<i>Sezgin Kilic</i>	
Author Index	753