

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

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

Alfred Kobsa

University of California, Irvine, CA, 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

TU Dortmund University, Germany

Madhu Sudan

Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbruecken, Germany

Leszek Rutkowski Marcin Korytkowski
Rafał Scherer Ryszard Tadeusiewicz
Lotfi A. Zadeh Jacek M. Zurada (Eds.)

Swarm and Evolutionary Computation

International Symposia, SIDE 2012 and EC 2012
Held in Conjunction with ICAISC 2012
Zakopane, Poland, April 29-May 3, 2012
Proceedings

Volume Editors

Leszek Rutkowski
Marcin Korytkowski
Rafał Scherer
Częstochowa University of Technology, Poland
E-mail: lrutko@kik.pcz.czyst.pl,
{marcin.korytkowski, rafal.scherer}@kik.pcz.pl

Ryszard Tadeusiewicz
AGH University of Science and Technology, Kraków, Poland
E-mail: rtad@agh.edu.pl

Lotfi A. Zadeh
University of California, Berkeley, CA, USA
E-mail: zadeh@cs.berkeley.edu

Jacek M. Zurada
University of Louisville, Louisville, KY, USA
E-mail: jacek.zurada@louisville.edu

ISSN 0302-9743
ISBN 978-3-642-29352-8
DOI 10.1007/978-3-642-29353-5
Springer Heidelberg Dordrecht London New York

e-ISSN 1611-3349
e-ISBN 978-3-642-29353-5

Library of Congress Control Number: 2012934673

CR Subject Classification (1998): I.2, H.3, F.1, I.4, H.4, I.5

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

© Springer-Verlag Berlin Heidelberg 2012

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.

The use of general descriptive names, 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 protective laws and regulations and therefore free for general use.

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

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume constitutes the proceedings of the International Symposium on Swarm and Evolutionary Computation organized as part of the 11th International Conference on Artificial Intelligence and Soft Computing, ICAISC 2012, held in Zakopane, Poland from April 29 to May 3, 2012. The symposium consisted of the Symposium on Swarm Intelligence and Differential Evolution (SIDE 2012) and the Symposium on Evolutionary Computation. Swarm intelligence (SI) is a computational intelligence technique which mimics and makes use of collective behavior (e.g., fish, birds, bees, ants, bacteria etc.) for solving search and optimization problems. The resulting algorithms are thus population-based systems of simple individuals interacting with one another and with their environment. Differential evolution (DE) is a special example of an optimizer since it shares some features with SI, mainly in the interaction amongst particles and selection scheme, but can also be considered as an evolutionary algorithm (EA). This symposium gathered new theoretical and implementation results, applications, reviews, and comparative studies. Special emphasis was placed on those studies which attempt to explain the working principles of the algorithms. I would like to thank the SIDE Committees, especially Ponnuthurai N. Suganthan, for organizing this successful event. The volume is divided into two parts: proceedings of the 2012 Symposium on Swarm Intelligence and Differential Evolution and the Symposium on Evolutionary Computation. This edition of the ICAISC also hosted the 4th International Workshop on Engineering Knowledge and Semantic Systems (IWEKSS 2012). The whole conference (ICAISC, SIDE and IWEKSS) attracted a total of 483 submissions from 48 countries and after the review process 212 papers were accepted for publication. I would like to thank our participants, invited speakers and reviewers of the papers for their scientific and personal contribution to the conference. Several reviewers were very helpful in reviewing the papers and are listed herein.

Finally, I thank my co-workers Łukasz Bartczuk, Agnieszka Cpalka, Piotr Dziwiński, Marcin Gabryel, Marcin Korytkowski and the conference secretary Rafał Scherer, for their enormous efforts to make the conference a very successful event. Moreover, I would like to acknowledge the work of Marcin Korytkowski, who designed the Internet submission system.

April 2012

Leszek Rutkowski

Organization

ICAISC 2012 was organized by the Polish Neural Network Society in cooperation with the SWSPiZ Academy of Management in Łódź, the Department of Computer Engineering at Częstochowa University of Technology, and the IEEE Computational Intelligence Society, Poland Chapter.

ICAISC Chairs

Honorary Chairmen	Lotfi Zadeh (USA) Jacek Żurada (USA)
General Chairman	Leszek Rutkowski (Poland)
Co-chairmen	Włodzisław Duch (Poland) Janusz Kacprzyk (Poland) Józef Korbicz (Poland) Ryszard Tadeusiewicz (Poland)

ICAISC Program Committee

Rafał Adamczak - Poland	Ian Cloete - Germany
Cesare Alippi - Italy	Oscar Cordón - Spain
Shun-ichi Amari - Japan	Bernard De Baets - Belgium
Rafał A. Angryk - USA	Nabil Derbel - Tunisia
Jarosław Arabas - Poland	Ewa Dudek-Dyduch - Poland
Robert Babuska - The Netherlands	Ludmiła Dymowa - Poland
Ildar Z. Batyrshin - Russia	Andrzej Dzieliński - Poland
James C. Bezdek - USA	David Elizondo - UK
Marco Block-Berlitz - Germany	Meng Joo Er - Singapore
Leon Bobrowski - Poland	Pablo Estevez - Chile
Leonard Bolc - Poland	János Fodor - Hungary
Piero P. Bonissone - USA	David B. Fogel - USA
Bernadette Bouchon-Meunier - France	Roman Galar - Poland
James Buckley - Poland	Alexander I. Galushkin - Russia
Tadeusz Burczynski - Poland	Adam Gaweda - USA
Andrzej Cader - Poland	Joydeep Ghosh - USA
Juan Luis Castro - Spain	Juan Jose Gonzalez de la Rosa - Spain
Yen-Wei CHEN - Japan	Marian Bolesław Gorzalczyński - Poland
Wojciech Cholewa - Poland	Krzysztof Grąbczewski - Poland
Fahmida N. Chowdhury - USA	Garrison Greenwood - USA
Andrzej Cichocki - Japan	Jerzy W. Grzymala-Busse - USA
Paweł Cichosz - Poland	Hani Hagras - UK
Krzysztof Cios - USA	Saman Halgamuge - Australia

VIII Organization

Rainer Hampel - Germany
Zygmunt Hasiewicz - Poland
Yoichi Hayashi - Japan
Tim Hendtlass - Australia
Francisco Herrera - Spain
Kaoru Hirota - Japan
Adrian Horzyk - Poland
Tingwen Huang - USA
Hisao Ishibuchi - Japan
Mo Jamshidi - USA
Andrzej Janczak - Poland
Norbert Jankowski - Poland
Robert John - UK
Jerzy Józefczyk - Poland
Tadeusz Kaczorek - Poland
Władysław Kamiński - Poland
Nikola Kasabov - New Zealand
Okyay Kaynak - Turkey
Vojislav Kecman - New Zealand
James M. Keller - USA
Etienne Kerre - Belgium
Frank Klawonn - Germany
Jacek Kluska - Poland
Leonid Kompanets - Poland
Przemysław Korohoda - Poland
Jacek Koronacki - Poland
Witold Kosiński - Poland
Jan M. Kościelny - Poland
Zdzisław Kowalczyk - Poland
Robert Kozma - USA
László Kóczy - Hungary
Rudolf Kruse - Germany
Boris V. Kryzhanovsky - Russia
Adam Krzyzak - Canada
Juliusz Kulikowski - Poland
Roman Kulikowski - Poland
Věra Kůrková - Czech Republic
Marek Kurzyński - Poland
Halina Kwaśnicka - Poland
Soo-Young Lee - Korea
George Lendaris - USA
Antoni Ligęza - Poland
Zhi-Qiang LIU - Hong Kong
Simon M. Lucas - UK
Jacek Łeski - Poland
Bohdan Macukow - Poland
Kurosh Madani - France
Luis Magdalena - Spain
Witold Malina - Poland
Krzysztof Malinowski - Poland
Jacek Mańdziuk - Poland
Antonino Marvuglia - Ireland
Andrzej Materka - Poland
Jarosław Meller - Poland
Jerry M. Mendel - USA
Radko Mesiar - Slovakia
Zbigniew Michalewicz - Australia
Zbigniew Mikrut - Poland
Sudip Misra - USA
Wojciech Moczulski - Poland
Javier Montero - Spain
Eduard Montseny - Spain
Kazumi Nakamatsu - Japan
Detlef D. Nauck - Germany
Antoine Naud - Poland
Edward Nawarecki - Poland
Ngoc Thanh Nguyen - Poland
Antoni Niederliński - Poland
Robert Nowicki - Poland
Andrzej Obuchowicz - Poland
Marek Ogiela - Poland
Erkki Oja - Finland
Stanisław Osowski - Poland
Nikhil R. Pal - India
Maciej Patan - Poland
Witold Pedrycz - Canada
Leonid Perlovsky - USA
Andrzej Pieczyński - Poland
Andrzej Piegat - Poland
Vincenzo Piuri - Italy
Lech Polkowski - Poland
Marios M. Polycarpou - Cyprus
Danil Prokhorov - USA
Anna Radzikowska - Poland
Ewaryst Rafajłowicz - Poland
Sarunas Raudys - Lithuania
Olga Rebrova - Russia
Vladimir Red'ko - Russia
Raúl Rojas - Germany
Imre J. Rudas - Hungary

Enrique H. Ruspini - USA	Yury Tiumentsev - Russia
Khalid Saeed - Poland	Vicenç Torra - Spain
Dominik Sankowski - Poland	Burhan Turksen - Canada
Norihide Sano - Japan	Shiro Usui - Japan
Robert Schaefer - Poland	Michael Wagenknecht - Germany
Rudy Setiono - Singapore	Tomasz Walkowiak - Poland
Paweł Sewastianow - Poland	Deliang Wang - USA
Jennie Si - USA	Jun Wang - Hong Kong
Peter Sincak - Slovakia	Lipo Wang - Singapore
Andrzej Skowron - Poland	Zenon Waszczyszyn - Poland
Ewa Skubalska-Rafajłowicz - Poland	Paul Werbos - USA
Roman Słowiński - Poland	Slawo Wesolkowski - Canada
Tomasz G. Smolinski - USA	Sławomir Wiak - Poland
Czesław Smutnicki - Poland	Bernard Widrow - USA
Pilar Sobrevilla - Spain	Kay C. Wiese - Canada
Janusz Starzyk - USA	Bogdan M. Wilamowski - USA
Jerzy Stefanowski - Poland	Donald C. Wunsch - USA
Paweł Strumillo - Poland	Maciej Wygralak - Poland
Ron Sun - USA	Roman Wyrzykowski - Poland
Johan Suykens Suykens - Belgium	Ronald R. Yager - USA
Piotr Szczepaniak - Poland	Xin-She Yang - UK
Eulalia J. Szmidt - Poland	Gary Yen - USA
Przemysław Śliwiński - Poland	John Yen - USA
Adam Słowik - Poland	Sławomir Zadrozny - Poland
Jerzy Świątek - Poland	Ali M.S. Zalzala - United Arab Emi- rates
Hideyuki Takagi - Japan	

SIDE Chairs

Janez Brest, University of Maribor, Slovenia
 Maurice Clerc, Independent Consultant
 Ferrante Neri, University of Jyväskylä, Finland

SIDE Program Chairs

Tim Blackwell, Goldsmiths College, UK
 Swagatam Das, Indian Statistical Institute, India
 Nicolas Monmarché, University of Tours, France
 Ponnuthurai N. Suganthan, Nanyang Technological University, Singapore

SIDE Program Committee

Ashish Anand, India	Mirjam Sepesy Maucec, Slovenia
Borko Boskovic, Slovenia	Marjan Mernik, Slovenia
Jagdish Chand Bansal, India	Godfrey Onwubolu, Canada
Carlos Coello Coello, Mexico	Jérôme Emeka Onwunalu, Canada
Iztok Fister, Slovenia	Quanke Pan, China
Bogdan Filipic, Slovenia	Gregor Papa, Slovenia
Sheldon Hui, Singapore	Boyang Qu, China
Peter D. Justesen, Denmark	Shahryar Rahnamayan, Canada
Nicolas Labroche, France	Jurij Silc, Slovenia
Jane Liang, China	Josef Tvrdik, Czech Republic
Hongbo Liu, China	M. N. Vrahatis, Greece
Efren Mezura Montes, Mexico	Daniela Zaharie, Romania
A. Nakib, France	Ales Zamuda, Slovenia
Rammohan Mallipeddi, Korea	Qingfu Zhang, UK
Slawomir Nasuto, UK	Shizheng Zhao, Singapore
Jouni Lampinen, Finland	

IWEKSS Program Committee

Jason J. Jung, Korea
Dariusz Krol, Poland
Ngoc Thanh Nguyen, Poland
Gonzalo A. Aranda-Corral, Spain
Myung-Gwon Hwang, Korea
Costin Badica, Romania
Grzegorz J. Nalepa, Krakow, Poland

ICAISC Organizing Committee

Rafał Scherer, Secretary
Lukasz Bartczuk, Organizing Committee Member
Piotr Dziwiński, Organizing Committee Member
Marcin Gabryel, Finance Chair
Marcin Korytkowski, Databases and Internet Submissions

Reviewers

R. Adamczak	T. Babczyński	A. Bielecki
M. Amasyal	M. Baczyński	T. Blackwell
A. Anand	C. Badica	L. Bobrowski
R. Angryk	L. Bartczuk	A. Borkowski
J. Arabas	M. Białko	L. Borzemski

B. Boskovic	J. Grzymala-Busse	V. Kurkova
J. Brest	R. Hampel	M. Kurzyński
T. Burczyński	C. Han	J. Kusiak
R. Burduk	Z. Hasiewicz	H. Kwaśnicka
K. Cetnarowicz	O. Henniger	N. Labroche
M. Chang	F. Herrera	S. Lee
W. Cholewa	Z. Hippe	Y. Lei
M. Choraś	A. Horzyk	J. Liang
R. Choraś	E. Hryniewicz	A. Ligęza
K. Choros	S. Hui	H. Liu
P. Cichosz	M. Hwang	B. Macukow
R. Cierniak	A. Janczak	K. Madani
P. Ciskowski	N. Jankowski	K. Malinowski
M. Clerc	S. Jaroszewicz	R. Mallipeddi
O. Cordon	J. Jung	J. Mańdziuk
B. Cyganek	W. Kacalak	U. Markowska-Kaczmar
R. Czabański	W. Kamiński	A. Martin
I. Czarnowski	A. Kasperski	J. Martyna
B. De Baets	W. Kazimierski	A. Materka
J. de la Rosa	V. Kecman	T. Matsumoto
L. Diosan	E. Kerre	V. Medvedev
G. Dobrowolski	H. Kim	J. Mendel
W. Duch	F. Klawonn	E. MezuraMontes
E. Dudek-Dyduch	P. Kłęsk	Z. Michalewicz
L. Dymowa	J. Kluska	J. Michalkiewicz
A. Dzieliński	A. Kołakowska	Z. Mikrut
P. Dziwiński	L. Kompanets	W. Mitkowski
S. Ehteram	J. Konopacki	W. Moczulski
J. Emeka Onwunalu	J. Korbicz	W. Mokrzycki
N. Evans	P. Korohoda	N. Monmarche
A. Fanea	J. Koronacki	T. Munakata
I. Fister	M. Korytkowski	A. Nakib
M. Flasiński	M. Korzeń	G. Nalepa
D. Fogel	W. Kosiński	S. Nasuto
M. Fraś	J. Kościelny	E. Nawarecki
M. Gabryel	L. Kotulski	A. Nawrat
A. Gawęda	Z. Kowalczuk	F. Neri
M. Giergiel	J. Kozlak	M. Nieniewski
P. Głomb	M. Kraft	A. Niewiadomski
F. Gomide	D. Krol	R. Nowicki
M. Gorzałczany	R. Kruse	A. Obuchowicz
E. Grabska	B. Kryzhanovsky	M. Ogiela
K. Grąbczewski	A. Krzyzak	G. Onwubolu
W. Greblicki	J. Kulikowski	S. Osowski
K. Grudziński	O. Kurasova	M. Pacholczyk

G. Papa	P. Sevastjanov	Y. Tiumentsev
K. Patan	J. Silc	K. Tokarz
A. Pieczyński	W. Skarbek	A. Tomczyk
A. Piegat	A. Skowron	V. Torra
Z. Pietrzykowski	K. Skrzypczyk	B. Trawinski
V. Piuri	E. Skubalska-	J. Tvrdik
R. Ptak	Rafajłowicz	M. Urbański
B. Qu	K. Slot	M. Vrahatis
A. Radzikowska	A. Słowik	M. Wagenknecht
E. Rafajłowicz	R. Słowiński	T. Walkowiak
S. Rahnamayan	J. Smoląg	H. Wang
E. Rakus-Andersson	C. Smutnicki	L. Wang
F. Rastegar	A. Sokołowski	J. Wąs
Š. Raudys	T. Sołtysiński	B. Wilamowski
R. Rojas	E. Straszecka	A. Wilbik
L. Rolka	B. Strug	M. Witczak
F. Rudziński	P. Strumillo	P. Wojewnik
A. Rusiecki	P. Suganthan	M. Wozniak
L. Rutkowski	J. Swacha	J. Zabrodzki
S. Sakurai	P. Szczepaniak	S. Zadrożny
N. Sano	E. Szmidt	D. Zaharie
A. Scherer	P. Śliwiński	A. Zamuda
R. Scherer	J. Świątek	S. Zhao
E. Segura	R. Tadeusiewicz	
R. Setiono	H. Takagi	

Table of Contents

Part I: Symposium on Swarm Intelligence and Differential Evolution

The <i>Pachycondyla Apicalis</i> Ants Search Strategy for Data Clustering Problems	3
<i>Djibrilla Amadou Kountché, Nicolas Monmarché, and Mohamed Slimane</i>	
PARADE: A Massively Parallel Differential Evolution Template for EASEA	12
<i>Jarosław Arabas, Ogier Maitre, and Pierre Collet</i>	
A 3D Discrete-Continuum Swarm Intelligence Simulation on GPU for Swarm Robotics and Biomedical Applications	21
<i>Li Bai and David Feltell</i>	
Gathering of Fat Robots with Limited Visibility and without Global Navigation	30
<i>Kálmán Bolla, Tamás Kovacs, and Gábor Fazekas</i>	
Parallel Migration Model Employing Various Adaptive Variants of Differential Evolution	39
<i>Petr Bujok and Josef Tvrđík</i>	
A Differential Evolution Algorithm Assisted by ANFIS for Music Fingering	48
<i>Roberto De Prisco, Gianluca Zaccagnino, and Rocco Zaccagnino</i>	
Hybridization of Differential Evolution and Particle Swarm Optimization in a New Algorithm: DEPSO-2S	57
<i>Abbas El Dor, Maurice Clerc, and Patrick Siarry</i>	
A Hybrid Artificial Bee Colony Algorithm for Graph 3-Coloring	66
<i>Iztok Fister Jr., Iztok Fister, and Janez Brest</i>	
Monte-Carlo Swarm Policy Search	75
<i>Jeremy Fix and Matthieu Geist</i>	
Compact Bacterial Foraging Optimization	84
<i>Giovanni Iacca, Ferrante Neri, and Ernesto Mininno</i>	

A Coevolutionary MiniMax Algorithm for the Detection of Nash Equilibrium	93
<i>Andrew Koh</i>	
Real-Time Tracking of Full-Body Motion Using Parallel Particle Swarm Optimization with a Pool of Best Particles	102
<i>Tomasz Krzeszowski, Bogdan Kwolek, Bogusław Rymut, Konrad Wojciechowski, and Henryk Josinski</i>	
Decomposition and Metaoptimization of Mutation Operator in Differential Evolution.....	110
<i>Karol Opara and Jarosław Arabas</i>	
Continuous Ant Colony Optimization for Identification of Time Delays in the Linear Plant.....	119
<i>Janusz Papliński</i>	
A Variable Iterated Greedy Algorithm with Differential Evolution for Solving No-Idle Flowshops	128
<i>M. Fatih Tasgetiren, Quan-Ke Pan, P.N. Suganthan, and Ozge Buyukdagli</i>	
Differential Evolution with Competing Strategies Applied to Partitional Clustering	136
<i>Josef Tvrdík and Ivan Krivý</i>	
Contiguous Binomial Crossover in Differential Evolution	145
<i>Matthieu Weber and Ferrante Neri</i>	
Population Reduction Differential Evolution with Multiple Mutation Strategies in Real World Industry Challenges	154
<i>Aleš Zamuda and Janez Brest</i>	

Part II: Evolutionary Algorithms and Their Applications

Genetic Optimization of Fuzzy Rule Based MAS Using Cognitive Analysis	165
<i>Petr Cermak and Michal Mura</i>	
Does Memetic Approach Improve Global Induction of Regression and Model Trees?	174
<i>Marcin Czajkowski and Marek Kretowski</i>	
Evolutionary Optimization of Decomposition Strategies for Logical Functions	182
<i>Stanisław Deniziak and Karol Wiczorek</i>	

Tournament Feature Selection with Directed Mutations	190
<i>Grzegorz Dudek</i>	
Fully Controllable Ant Colony System for Text Data Clustering	199
<i>Piotr Dziwiński, Łukasz Bartczuk, and Janusz T. Starczewski</i>	
Creating Learning Sets for Control Systems Using an Evolutionary Method	206
<i>Marcin Gabryel, Marcin Woźniak, and Robert K. Nowicki</i>	
Random State Genetic Algorithm	214
<i>Louis Gacôgne</i>	
Accuracy vs. Interpretability of Fuzzy Rule-Based Classifiers: An Evolutionary Approach	222
<i>Marian B. Gorzalczany and Filip Rudziński</i>	
Genetic Fuzzy Rule-Based Modelling of Dynamic Systems Using Time Series	231
<i>Marian B. Gorzalczany and Filip Rudziński</i>	
Application of the Ant Colony Optimization Algorithm for Reconstruction of the Thermal Conductivity Coefficient	240
<i>Edyta Hetmaniok, Damian Słota, and Adam Zielonka</i>	
Comparison of ABC and ACO Algorithms Applied for Solving the Inverse Heat Conduction Problem	249
<i>Edyta Hetmaniok, Damian Słota, Adam Zielonka, and Roman Witula</i>	
Optimising Search Engines Using Evolutionally Adapted Language Models in Typed Dependency Parses	258
<i>Marcin Karwinski</i>	
The Modified IWO Algorithm for Optimization of Numerical Functions	267
<i>Daniel Kostrzewa and Henryk Josiński</i>	
Solving Fuzzy Job-Shop Scheduling Problem by a Hybrid PSO Algorithm	275
<i>Junqing Li, Quan-Ke Pan, P.N. Suganthan, and M. Fatih Tasgetiren</i>	
On Designing Genetic Algorithms for Solving Small- and Medium-Scale Traveling Salesman Problems	283
<i>Chun Liu and Andreas Kroll</i>	
Explore Influence of Differential Operator in DE Mutation with Unrestrained Method to Generate Mutant Vector	292
<i>Hao Liu, Han Huang, and Shusen Liu</i>	

Survey on Particle Swarm Optimization Based Clustering Analysis	301
<i>Veenu Mangat</i>	
Glowworm Optimization	310
<i>Jakub Niwa</i>	
A Comparison of Two Adaptation Approaches in Differential Evolution	317
<i>Radka Poláková and Josef Tvrđík</i>	
The Fuzzy-Genetic System for Multiobjective Optimization	325
<i>Krzysztof Pytel and Tadeusz Nawarycz</i>	
Fletcher's Filter Methodology as a Soft Selector in Evolutionary Algorithms for Constrained Optimization	333
<i>Ewaryst Rafajłowicz and Wojciech Rafajłowicz</i>	
Pointwise Convergence of Discrete Ant System Algorithm	342
<i>Paweł Rembelski and Witold Kosiński</i>	
Evolutionary and Meta-evolutionary Approach for the Optimization of Chaos Control	350
<i>Roman Senkerik, Zuzana Oplatková, Donald Davendra, and Ivan Zelinka</i>	
Evolutionary Multi-objective Optimization of Personal Computer Hardware Configurations	359
<i>Adam Slowik</i>	
Type-2 Fuzzy Logic Control of Trade-off between Exploration and Exploitation Properties of Genetic Algorithms	368
<i>Adam Slowik</i>	
A Parallel Genetic Algorithm for Propensity Modeling in Consumer Finance	377
<i>Ramasubramanian Sundararajan, Tarun Bhaskar, and Padmini Rajagopalan</i>	
Hybrid Particle Swarm Optimizer and Its Application in Identification of Room Acoustic Properties	386
<i>Miroslaw Szczepanik, Arkadiusz Poteralski, Jacek Ptaszny, and Tadeusz Burczyński</i>	
reCORE – A Coevolutionary Algorithm for Rule Extraction	395
<i>Bogdan Trawiński and Grzegorz Matoga</i>	
MGPSO – The Managed Evolutionary Optimization	404
<i>Radosław Z. Ziemiński</i>	
Author Index	413