

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

Bijaya Ketan Panigrahi
Swagatam Das
Ponnuthurai Nagarathnam Suganthan
Pradipta Kumar Nanda (Eds.)

Swarm, Evolutionary, and Memetic Computing

Third International Conference, SEMCCO 2012
Bhubaneswar, India, December 20-22, 2012
Proceedings



Springer

Volume Editors

Bijaya Ketan Panigrahi
Indian Institute of Technology
Department of Electrical Engineering
New Delhi 110016, India
E-mail: bkpanigrahi@ee.iitd.ac.in

Swagatam Das
Indian Statistical Institute
Electronics and Communication Sciences Unit
Kolkata 700108, India
E-mail: swagatam.das@ieee.org

Ponnuthurai Nagaratnam Suganthan
Nanyang Technological University
School of Electrical and Electronic Engineering
Singapore 639798, Singapore
E-mail: epnsugan@ntu.edu.sg

Pradipta Kumar Nanda
Siksha "0" Anusandhan University
Department of Electronics and Telecom. Engineering
Institute of Technical Education & Research
Odisha 751030, India
E-mail: pknanda@iter.ac.in

ISSN 0302-9743
ISBN 978-3-642-35379-6
DOI 10.1007/978-3-642-35380-2
Springer Heidelberg Dordrecht London New York

e-ISSN 1611-3349
e-ISBN 978-3-642-35380-2

Library of Congress Control Number: 2012952995

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

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 LNCS volume contains the papers presented at the Third Swarm, Evolutionary and Memetic Computing Conference (SEMCCO 2012) held during December 20–22, 2012, at the Institute of Technical Education and Research, Siksha ‘O’ Anusandhan University, Bhubaneswar, Odisha, India. SEMCCO is regarded as one of the most prestigious international conference series, aiming to bring together researchers from academia and industry to report and review the latest progress in cutting-edge research with swarm, evolutionary, memetic computing, and other novel computing techniques such as neural and fuzzy computing, and thereby to explore new application areas, to design new bio-inspired algorithms for solving specific hard optimization problems, and finally to create awareness of these domains in a wider audience of practitioners.

SEMCCO 2012 received 310 paper submissions from 25 countries across the globe. After a rigorous peer-review process involving 990 reviews, 96 full-length articles were accepted for oral presentation at the conference. This corresponds to an acceptance rate of 31% and is intended for maintaining the high standards of the conference proceedings. The papers included in this LNCS volume cover a wide range of topics in swarm, evolutionary, memetic, and other intelligent computing algorithms and their real-world applications in problems selected from diverse domains of science and engineering.

The conference featured four distinguished keynote speakers. The lectures included Xin Yao’s talk on “Cooperatively Coevolving Particle Swarms for Large Scale Optimization,” Hisao Ishibuchi’s talk on “Parallel Distributed Fuzzy Genetics-Based Machine Learning,” Kumar Venayagamoorthy’s talk on “Computational Intelligence Applications in Smart Grids,” and Kalyanmoy Deb’s lecture on “Multiobjective Evolutionary Algorithms.”

We take this opportunity to thank the authors of all submitted papers for their hard work, adherence to the deadlines, and patience with the review process. The quality of a refereed volume depends mainly on the expertise and dedication of the reviewers. We are indebted to the Program Committee and Technical Committee members, who not only produced excellent reviews but also did so in the short timeframes they were given.

We would also like to thank our sponsors for providing all the logistical support and financial assistance. First, we are indebted to ITER Management and Administrations (faculty colleagues and administrative personnel of the School of Computer Science, School of Electronics Engineering, and School of Electrical Engineering) for supporting our cause and encouraging us to organize the conference at ITER, SOA University, Bhubaneswar, Odisha. In particular, we would like to express our heart-felt thanks to Manojranjan Nayak, President, Siksha O. Anusandhan Trust, for providing us with the necessary financial support and infrastructural assistance to hold the conference. Our sincere thanks are due to

R.P. Mohanty, Vice Chancellor, SOA University, R.K. Mishra, Dean, ITER, and P.K. Dash, Director, Research, for their continuous support. We thank Carlos A. Coello Coello and Nikhil R. Pal, the General Chairs, for providing valuable guidelines and inspiration to overcome various difficulties in the process of organizing this conference. We deeply regret the sad and untimely demise of one of our beloved colleagues – Satish Kumar of the Dayal Bag Educational Institute, Agra, India. Professor Kumar had agreed to deliver a keynote lecture on neuro-fuzzy systems at this conference. He is known to many of us through his marvelous book on *Neural Networks* published by Tata McGraw Hill. Apart from a great scientist and a prolific writer, he was a wonderful human being. A session at the conference was dedicated to the memory of Prof. Kumar.

We would also like to thank the participants of this conference, who considered the conference above all hardships. Finally, we would like to thank all the volunteers whose tireless efforts in meeting the deadlines and arranging every detail ensured that the conference ran smoothly. We hope the readers of this proceedings volume find the papers inspiring and enjoyable.

December 2012

Bijaya Ketan Panigrahi
Swagam Das
P.N. Suganthan
P.K. Nanda

Organization

Chief Patron

Manojranjan Nayak, India

Patron

R.P. Mohanty, India

Honorary Chair

P.K. Dash

General Chairs

Nikhil R. Pal, India

Carlos A. Coello Coello, Mexico

General Co-chairs

Swagatam Das, India

B.K. Panigrahi, India

Program Chairs

R.K. Mishra, India

P.K. Nanda, India

Finance Chair

Manas Kumar Mallick, India

Steering Committee Chair

P.N. Suganthan, Singapore

Publicity Chairs

S.S. Dash, India

S.C. Satpathy, India

N.C. Sahoo, Malaysia

Special Session Chairs

Sanjoy Das, USA
Zhihua Cui, China
Samuelson Hong, Taiwan

Tutorial Chair

G. Panda, India

Organizing Secretariat

Debahuti Mishra
A.K. Jagadev, India

International Advisory Committee / Technical Review Committee

Almoataz Youssef Abdelaziz, Egypt	Jeng-Shyang Pan, Taiwan
Athanasios V. Vasilakos, Athens	Juan Luis Fernández Martínez, Spain
Alex K. Qin, France	Jeng-Shyang Pan, Taiwan
Amit Konar, India	Kalyanmoy Deb, India
Anupam Shukla, India	K. Parsopoulos, Greece
Ashish Anand, India	Kay Chen Tan, Singapore
Boyang Qu, China	Ke Tang, China
Carlos A. Coello Coello, Mexico	K. Shanti Swarup, India
Chilukuri K. Mohan, USA	Lakhmi Jain, Australia
Delin Luo, China	Leandro Dos Santos Coelho, Brazil
Dipankar Dasgupta, USA	Ling Wang, China
D.K. Chaturvedi, India	Lingfeng Wang, China
Dipti Srinivasan, Singapore	M.A. Abido, Saudi Arabia
Fatih M. Tasgetiren, Turkey	M.K. Tiwari, India
Ferrante Neri, Finland	Maurice Clerc, France
Frank Neumann, Australia	Meng Joo Er, Singapore
Fayzur Rahman, Portugal	Meng-Hiot Lim, Singapore
G.K. Venayagamoorthy, USA	M.F. Tasgetiren, Turkey
Gerardo Beni, USA	Namrata Khemka, USA
Hai Bin Duan, China	N. Puhana, India
Heitor Silvério Lopes, Brazil	Oscar Castillo, Mexico
Halina Kwasnicka, Poland	Pei-Chann Chang, Taiwan
Hong Yan, Hong Kong	Peng Shi, UK
Javier Del Ser, Spain	Qingfu Zhang, UK
Jane J. Liang, China	Quanke Pan, China
Janez Brest, Slovenia	Rafael Stubs Parpinelli, Brazil

Rammohan Mallipeddi, Singapore
 Roderich Gross, UK
 Ruhul Sarker, Australia
 Richa Sing, India
 Robert Kozma, USA
 Ravipudi Venkata Rao, India
 Suresh Sundaram, Singapore
 S. Baskar, India
 S.K. Udgata, India
 S.S. Dash, India
 S.S. Pattanaik, India

S.G. Ponnambalam, Malaysia
 Saeid Nahavandi, Australia
 Saman Halgamuge, Australia
 Shizheng Zhao, Singapore
 Sachidananda Dehuri, Korea
 Samuelson W. Hong, Taiwan
 X.Z. Gao, Finland
 Yew Soon Ong, Singapore
 Ying Tan, China
 Yucheng Dong , China

Organizing Committee

Niva Das
 Guru Prasad Mishra
 Renu Sharma
 Bibhu Prasad Mohanty
 Badri Narayan Sahoo
 Kabri Das
 Biswa Mohan Acharya
 Priyabrata Pattnaik
 Sharmista Kar
 Tapas Kumar Mohapatra

Sajia Hassan
 Anuja Nanda
 Sandeep Kumar Satapathy
 Ambika Prasad Mishra
 Manas Kumar Nanda
 Sikha Mishra
 Nibedan Panda
 Shruti Mishra
 Soumendra Mohanty

Table of Contents

Investigation of Mutation Schemes in Real-Parameter Genetic Algorithms	1
<i>Debayan Deb and Kalyanmoy Deb</i>	
Discrete Harmony Search Algorithm for Dynamic FJSSP in Remanufacturing Engineering	9
<i>Kaizhou Z. Gao, Ponnuthurai Nagaratnam Suganthan, and Tay Jin Chua</i>	
Multilevel Image Thresholding Based on Tsallis Entropy and Differential Evolution	17
<i>Soham Sarkar, Swagatam Das, and Sheli Sinha Chaudhuri</i>	
Convergence and Boundary Estimation of the Particle Dynamics in Generalized Particle Swarm Optimization	25
<i>Dipankar Maity and Udit Halder</i>	
Application of Differential Evolution with Best of Random Mutation Strategy on Asymmetric Location Only Synthesis of Broadside Circular Antenna Array	33
<i>Sudipta Das, Durbadal Mandal, Sakti Prasad Ghoshal, and Rajib Kar</i>	
Performance Evaluation of Bacterial Foraging Optimization Algorithm for the Early Diagnosis and Tracking of Alzheimer's Disease	41
<i>Tinu Varghese, R. Sheela Kumari, P.S. Mathuranath, and N. Albert Singh</i>	
Multi-sensor Satellite Image Analysis Using Niche Genetic Algorithm for Flood Assessment	49
<i>J. Senthilnath, P.B. Shreyas, Ritwik Rajendra, S.N. Omkar, V. Mani, and P.G. Diwakar</i>	
Solution to Economic Load Dispatch Problem Based on FIREFLY algorithm and Its Comparison with BFO, CBFO-S and CBFO-Hybrid	57
<i>Ananthanaryanan Rathinam and Ripunjoy Phukan</i>	
MESFET DC Model Parameter Extraction Using Adaptive Accelerated Exploration Particle Swarm Optimizer	66
<i>Layak Ali, Samrat L. Sabat, and Siba K. Udgata</i>	

Kernel Group Method of Data Handling: Application to Regression Problems	74
<i>Kalam Narendar Reddy and Vadlamani Ravi</i>	
An Efficient Algorithm for Gray Level Image Enhancement Using Cuckoo Search	82
<i>Sanjay Agrawal and Rutuparna Panda</i>	
A Multi-objective Workspace Optimization of 3R Manipulator Using Modified PSO	90
<i>Sumanta Panda, Debadutta Mishra, and B.B. Biswal</i>	
An Analysis of Genetic Algorithm Based Anycast Routing in Delay and Disruption Tolerant Networks	98
<i>Éderson R. Silva and Paulo R. Guardieiro</i>	
Reactive Power Optimization Using Hybrid Cultural Algorithm	106
<i>Bidishna Bhattacharya, Kamal Krishna Mandal, and Niladri Chakraborty</i>	
Techno-Economic Feasibility Analysis of Hybrid Renewable Energy System Using Improved Version of Particle Swarm Optimization	116
<i>Bhimsen Tudu, Preetam Roy, Sajjan Kumar, Diptendu Pal, Kamal Krishna Mandal, and Niladri Chakraborty</i>	
Software Effort Prediction Using Fuzzy Clustering and Functional Link Artificial Neural Networks	124
<i>Tirimula Rao Benala, Rajib Mall, Satchidananda Dehuri, and V.L. Prasanthi</i>	
Optimal Placement and Sizing of Distributed Generation in Radial Distribution System Using Differential Evolution Algorithm	133
<i>Manas R. Nayak, Subrat K. Dash, and Pravat Kumar Rout</i>	
Clustering Algorithm Recommendation: A Meta-learning Approach	143
<i>Daniel G. Ferrari and Leandro Nunes de Castro</i>	
A Clustering Particle Based Artificial Bee Colony Algorithm for Dynamic Environment	151
<i>Subhodip Biswas, Digbalay Bose, and Souvik Kundu</i>	
A Selective Teaching-Learning Based Niching Technique with Local Diversification Strategy	160
<i>Souvik Kundu, Subhodip Biswas, Swagatam Das, and Digbalay Bose</i>	
Efficient Dynamic Routing on Large Road Networks	169
<i>Mohanasuram Geetha, G.M. Kadhar Nawaz Gulammohien, and S. Saravanan</i>	

Performance of Informative Differential Evolution Algorithm with Self Adaptive Re-clustering Technique on the Problems of Electromagnetism –The Linear Array Antenna Synthesis	181
<i>Dipankar Maity, Udit Halder, and Sheli Sinha Chaudhuri</i>	
Differential Evolution with a Relational Neighbourhood-Based Strategy for Numerical Optimization	189
<i>Souvik Kundu, Digbalay Bose, and Subhodip Biswas</i>	
A Simulated Annealing Heuristic for Minimizing Makespan in Parallel Machine Scheduling	198
<i>Dipak Laha</i>	
Rule Extraction from DEWNN to Solve Classification and Regression Problems	206
<i>Nekuri Naveen, Vadlamani Ravi, and Chillarige Raghavendra Rao</i>	
A New Improved Self Adaptive Particle Swarm Optimization Technique for Economic Load Dispatch	215
<i>Kamal Krishna Mandal, Bidishna Bhattacharya, Bhimsen Tudu, and Niladri Chakraborty</i>	
Memetic Algorithm Based Task Scheduling Using Probabilistic Local Search	224
<i>S. Padmavathi, S. MohitGolchha, and A. SeeniMohamed</i>	
Neighborhood Search Based Artificial Bee Colony Algorithm for Numerical Function Optimization	232
<i>Anguluri Rajasekhar, Swagatam Das, Bijaya Ketan Panigrahi, and Manas Kumar Mallick</i>	
Path Generation and Obstacle Avoidance of an Autonomous Mobile Robot Using Intelligent Hybrid Controller	240
<i>Prases Kumar Mohanty and Dayal R. Parhi</i>	
An Adaptive Memetic Algorithm for Multi-robot Path-Planning	248
<i>Pratyusha Rakshit, Dhrubojyoti Banerjee, Amit Konar, and Ramadoss Janarthanan</i>	
Power Loss Minimization by the Placement of DG in Distribution System Using GA	259
<i>Dasarathan Sattianadan, M. Sudhakaran, Subhransu Sekhar Dash, and K. Vijayakumar</i>	
Multipopulation Based Differential Evolution with Self Exploitation Strategy	267
<i>Rupam Kundu, Rohan Mukherjee, and Shantanab Debchoudhury</i>	

Clustered Parent Centric Normal Cross-Over for Multimodal Optimization	276
<i>Rohan Mukherjee, Rupam Kundu, and Swagatam Das</i>	
Stock Indices Prediction Using Radial Basis Function Neural Network	285
<i>Minakhi Rout, Babita Majhi, Usha Manasi Mohapatra, and Rosalin Mahapatra</i>	
Gene Subset Selection for Cancer Classification Using Statistical and Rough Set Approach	294
<i>Asit Kumar Das and Soumen Kumar Pati</i>	
Support Vector Machine for Large Databases as Classifier	303
<i>Rahul Kumar Sevakula and Nishchal K. Verma</i>	
Solution to Economic Load Dispatch Problem Based on BFO, CBFO-S and CBFO-H Algorithms and Its Advantages over the PSO	314
<i>Ananthanaryanan Rathinam and Ripunjoy Phukan</i>	
Rough Set Based Fuzzy K-Modes for Categorical Data.....	323
<i>Indrajit Saha, Jnanendra Prasad Sarkar, and Ujjwal Maulik</i>	
Teaching Learning Opposition Based Optimization for the Location of Median Line in 3-D Space	331
<i>Anguluri Rajasekhar and Swagatam Das</i>	
Modified Onlooker Phase in Artificial Bee Colony Algorithm	339
<i>Tarun Kumar Sharma, Millie Pant, and V.P. Singh</i>	
Complex-Valued Neuro-Fuzzy Inference System Based Classifier	348
<i>Kartick Subramanian, Ramaswamy Savitha, Sundaram Suresh, and B.S. Mahanand</i>	
Neural Network Based Model Predictive Controller for Simplified Heave Model of an Unmanned Helicopter	356
<i>Mahendra Kumar Samal, Sreenatha Anavatti, and Matthew Garratt</i>	
Hybrid Biogeography Based Simultaneous Feature Selection and Prediction of N-Myristoylation Substrate Proteins Using Support Vector Machines and Random Forest Classifiers	364
<i>Shameek Ghosh, Nayana Ramachandran, C. Venkateshwari, and V.K. Jayaraman</i>	
Plant Leaf Disease Detection Using Gabor Wavelet Transform	372
<i>Shitala Prasad, Piyush Kumar, Ranjay Hazra, and Ajay Kumar</i>	

Analysis of Vasculature in Human Retinal Images Using Particle Swarm Optimization Based Tsallis Multi-level Thresholding and Similarity Measures	380
<i>Nadaradjane Sri Madhava Raja, Ganesan Kavitha, and Swaminathan Ramakrishnan</i>	
Optimal Reactive Power Compensation for Improvement of Steady State Voltage Stability Limit under Stressed System Condition Using BF Algorithm	388
<i>Santi Behera and Manish Tripathy</i>	
Optimal Placement of Capacitors in Distribution Networks Using a Modified Teaching-Learning Based Algorithm	398
<i>Ankita Mohapatra, Bijaya Ketan Panigrahi, Bhim Singh, and Ramesh Bansal</i>	
Gene Expression Programming Algorithm for Transient Security Classification	406
<i>Almoataz Y. Abdelaziz, S.F. Mekhamer, H.M. Khattab, M.L.A. Badr, and Bijaya Ketan Panigrahi</i>	
PSO-Tuned Control Parameter in Differential Evolution Algorithm	417
<i>Tapas Si, Nanda Dulal Jana, and Jaya Sil</i>	
On the Non Linear Dynamics of the Global Best Particle in Particle Swarm Optimization	425
<i>Dipankar Maity, Udit Halder, Swagatam Das, and Bijaya Ketan Panigrahi</i>	
Adaptive Differential Evolution with Directional Information Based Search Moves	433
<i>Satyajit Neogi, Deblina Das, and Swagatam Das</i>	
A Fuzzy Programming Method for Solving Multiobjective Chance Constrained Programming Problems Involving Log-Normally Distributed Fuzzy Random Variables	442
<i>Animesh Biswas and Arnab Kumar De</i>	
Minimization of Side Lobe of Optimized Uniformly Spaced and Non-uniform Excited Time Modulated Linear Antenna Arrays Using Genetic Algorithm	451
<i>Gopi Ram Hardel, Durbadal Mandal, Sakti Prasad Ghoshal, and Rajib Kar</i>	
Circular Antenna Array Design Using Novel Perturbation Based Artificial Bee Colony Algorithm	459
<i>Digbalay Bose, Souvik Kundu, Subhodip Biswas, and Swagatam Das</i>	

Cooperative Co-evolutionary Teaching-Learning Based Algorithm with a Modified Exploration Strategy for Large Scale Global Optimization . . .	467
<i>Subhodip Biswas, Sowik Kundu, Digbalay Bose, and Swagatam Das</i>	
Brain Storming Incorporated Teaching-Learning-Based Algorithm with Application to Electric Power Dispatch	476
<i>K.R. Ramanand, K.R. Krishnanand, Bijaya Ketan Panigrahi, and Manas Kumar Mallick</i>	
Associated and Assorted Recombination in SBX Operator for Problems with Linkages	484
<i>Arnav Acharyya and Kalyanmoy Deb</i>	
Scalable Fuzzy Genetic Classifier Based on Fitness Approximation	492
<i>Harihar Kalia, Satchidananda Dehuri, and Ashish Ghosh</i>	
Multi Objective Integrated Layout Design Problem	500
<i>I. Jerin Leno, S. Saravana Sankar, and S.G. Ponnambalam</i>	
Dynamic Network Traffic Data Classification for Intrusion Detection Using Genetic Algorithm	509
<i>Rahul Mitra, Sahisnu Mazumder, Tuhin Sharma, Nandita Sengupta, and Jaya Sil</i>	
2DOF PID Controller Tuning for Unstable Systems Using Bacterial Foraging Algorithm	519
<i>K. Latha and V. Rajinikanth</i>	
Generation of Sufficient Cut Points to Discretize Network Traffic Data Sets	528
<i>Sahisnu Mazumder, Tuhin Sharma, Rahul Mitra, Nandita Sengupta, and Jaya Sil</i>	
Parameters Optimization of Continuous Casting Process Using Teaching-Learning-Based Optimization Algorithm	540
<i>Ravipudi Venkata Rao and Vivek D. Kalyankar</i>	
Genetic Algorithm Based Approach for Optimal Allocation of TCSC for Power System Loadability Enhancement	548
<i>Almoataz Y. Abdelaziz, M.A. El-Sharkawy, M.A. Attia, and Bijaya Ketan Panigrahi</i>	
Wavelet-ANN Model for Nutrient Load Predictions in Rivers	558
<i>Raj Mohan Singh</i>	
Performance Analysis and Design of Proportional Integral Derivative Controlled Automatic Voltage Regulator System Using Local Unimodal Sampling Optimization Technique	566
<i>Pradeep Kumar Mohanty, Binod Kumar Sahu, Sidhartha Panda, Sanjeeb Kumar Kar, and Nandan Mishra</i>	

Particle Swarm Optimization Trained Auto Associative Neural Networks Used as Single Class Classifier	577
<i>Vadlamani Ravi, Naveen Nekuri, and Manideepto Das</i>	
A Network Theoretic Analysis of Evolutionary Algorithms	585
<i>Karthik Kuber, Stuart W. Card, Kishan G. Mehrotra, and Chilukuri K. Mohan</i>	
Characterization of Trabecular Architecture in Human Femur Radiographic Images Using Directional Multiresolution Transform and AdaBoost Model	594
<i>Thomas Christy Bobby and Swaminathan Ramakrishnan</i>	
Missing Value Estimation of Microarray Data Using Similarity Measurement	602
<i>Soumen Kumar Pati and Asit Kumar Das</i>	
A Strategy Pool Adaptive Artificial Bee Colony Algorithm for Dynamic Environment through Multi-population Approach	611
<i>Digbalay Bose, Subhodip Biswas, Souvik Kundu, and Swagatam Das</i>	
Multistage Covariance Matrix Adaptation with Differential Evolution for Constrained Optimization	620
<i>Shantanab Debchoudhury, Rohan Mukherjee, and Rupam Kundu</i>	
Evolutionary and Immune Algorithms Applied to Association Rule Mining	628
<i>Danilo Souza da Cunha and Leandro Nunes de Castro</i>	
Improving Adaptive Differential Evolution with Controlled Mutation Strategy	636
<i>Sayan Basu Roy, Mainak Dan, and Pallavi Mitra</i>	
Modified Particle Swarm Optimization with Switching Update Strategy	644
<i>Rupam Kundu, Rohan Mukherjee, and Swagatam Das</i>	
Statistical Analysis Based Adjustment Method for Convergence Rate of Spiral Optimization	653
<i>Kenichi Tamura and Keiichiro Yasuda</i>	
Neglect Benevolence in Human-Swarm Interaction with Communication Latency	662
<i>Phillip Walker, Steven Nunnally, Mike Lewis, Andreas Kolling, Nilanjan Chakraborty, and Katia Sycara</i>	
A Comment on Bio-inspired Optimisation via GPU Architecture: The Genetic Algorithm Workload	670
<i>Paula Prata, Paulo Fazendeiro, Pedro Sequeira, and Chandrashekhhar Padole</i>	

Optimal Location and Sizing of DG for Congestion Management in Deregulated Power Systems	679
<i>K. Vijayakumar and R. Jegatheesan</i>	
A Novel Strategy Adaptive Genetic Algorithm with Greedy Local Search for the Permutation Flowshop Scheduling Problem	687
<i>Srinjoy Ganguly, Swahum Mukherjee, Debabrota Basu, and Swagatam Das</i>	
Estimation of Autocorrelation Space for Classification of Bio-medical Signals	697
<i>Mihir Narayan Mohanty and Aurobinda Routray</i>	
Dimension Reduction Using Clustering Algorithm and Rough Set Theory	705
<i>Shampa Sengupta and Asit Kumar Das</i>	
Connectivity Differences between Human Operators of Swarms and Bandwidth Limitations	713
<i>Steven Nunnally, Phillip Walker, Michael Lewis, Andreas Kolling, Nilanjan Chakraborty, and Katia Sycara</i>	
Analysis of Emergent Selection Pressure in Evolutionary Algorithm and Machine Learner Offspring Filtering Hybrids	721
<i>Mark Coletti and Guido Cervone</i>	
OpenCL Implementations of a Genetic Algorithm for Feature Selection in Periocular Biometric Recognition	729
<i>Paulo Fazendeiro, Chandrashekhar Padole, Pedro Sequeira, and Paula Prata</i>	
Face Authentication Using Supervised Learning Techniques	738
<i>Amioy Kumar, Rohan Gupta, Akshay Sharma, Bijaya Ketan Panigrahi, and M. Hanmandlu</i>	
Design of Non-uniform Circular Antenna Arrays Using Coordinated Bacterial Dynamics and Opposite Numbers	746
<i>Jaydeep Ghosh Chowdhury, Aritra Chowdhury, Arghya Sur, and Swagatam Das</i>	
Process Plan and Scheduling Integration for Near Optimal Process Plans in Networked Based Manufacturing Using Controlled Elitist NSGA-II and Territory Defining Algorithms	754
<i>V.K. Manupati, J.J. Thakkar, Priyabrata Mohapatra, Ajay Kumar, and M.K. Tiwari</i>	
Teaching Learning Based Optimization for Neural Networks Learning Enhancement	761
<i>Suresh Chandra Satapathy, Anima Naik, and K. Parvathi</i>	

Large Scale Optimization Based on Co-ordinated Bacterial Dynamics and Opposite Numbers	770
<i>Jaydeep Ghosh Chowdhury, Aritra Chowdhury, and Arghya Sur</i>	
A Strategy Adaptive Genetic Algorithm for Solving the Travelling Salesman Problem	778
<i>Swahum Mukherjee, Srinjoy Ganguly, and Swagatam Das</i>	
Efficient Design of Cosine-Modulated Filter Banks Using Evolutionary Multi-objective Optimization	785
<i>Md. Nasir, Soumyadip Sengupta, and Swagatam Das</i>	
Voltage Stability Constrained Optimal Power Flow Using Non-dominated Sorting Genetic Algorithm-II (NSGA II)	793
<i>C. Nithya, J. Preetha Roselyn, D. Devaraj, and Subhransu Sekhar Dash</i>	
Markov Random Field Model Based Graduated Penalty Function for Reinforcing Ill-Defined Edges in Color Image Segmentation.....	802
<i>Panda Sucheta and P.K. Nanda</i>	
Author Index	811