

LNCs 4432

Bartłomiej Beliczynski
Andrzej Dzieliński
Marcin Iwanowski
Bernardete Ribeiro (Eds.)

Adaptive and Natural Computing Algorithms

8th International Conference, ICANNGA 2007
Warsaw, Poland, April 2007
Proceedings, Part II

2 Part II

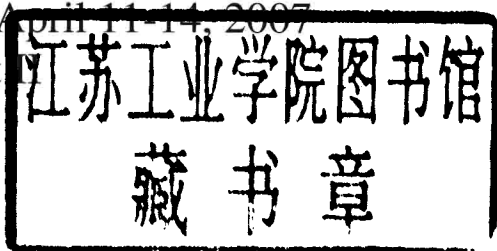


Springer

Bartłomiej Beliczynski Andrzej Dzielinski
Marcin Iwanowski Bernardete Ribeiro (Eds.)

Adaptive and Natural Computing Algorithms

8th International Conference, ICANNGA 2007
Warsaw, Poland, April 11-14, 2007
Proceedings, Part I



Volume Editors

Bartłomiej Beliczynski
Andrzej Dzieliński
Marcin Iwanowski
Warsaw University of Technology
Institute of Control and Industrial Electronics
ul. Koszykowa 75, 00-662 Warszawa, Poland
E-mail: {B.Beliczynski,A.Dzieliński,M.Iwanowski}@ee.pw.edu.pl

Bernardete Ribeiro
University of Coimbra
Department of Informatics Engineering
Polo II, 3030-290 Coimbra, Portugal
E-mail: bribeiro@dei.uc.pt

Library of Congress Control Number: 2007923870

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

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

ISSN	0302-9743
ISBN-10	3-540-71590-8 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-71590-0 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: 12041145 06/3180 5 4 3 2 1 0

Preface

The ICANNGA series of conferences has been organized since 1993 and has a long history of promoting the principles and understanding of computational intelligence paradigms within the scientific community. Starting in Innsbruck, in Austria (1993), then Ales in France (1995), Norwich in England (1997), Portoroz in Slovenia (1999), Prague in Czech Republic (2001), Roanne in France (2003) and finally Coimbra in Portugal (2005), the ICANNGA series has established itself as a reference for scientists and practitioners in this area. The series has also been of value to young researchers wishing both to extend their knowledge and experience and to meet experienced professionals in their fields.

In a rapidly advancing world, where technology and engineering change dramatically, new challenges in computer science compel us to broaden the conference scope in order to take into account new developments. Nevertheless, we have kept the acronym ICANNGA which, since the Coimbra conference in 2005, stands for International Conference on Adaptive and Natural Computing Algorithms.

The 2007 conference, the eighth in the ICANNGA series, took place at the Warsaw University of Technology in Poland, drawing on the experience of previous events and following the same general model, combining technical sessions, including plenary lectures by renowned scientists, with tutorials and workshop panels.

The Warsaw edition of ICANNGA attracted many scientists from all over the world. We received 474 mostly high-quality submissions from 40 countries. After rigorous review involving more than 160 experts in their fields, 178 papers were accepted and included in the proceedings. The acceptance rate was only 38%, enforcing a high standard of papers. The conference proceedings are published in two volumes of Springer's *Lecture Notes in Computer Science*.

The first volume of the proceedings is primarily concerned with issues related to various concepts and methods of optimization, evolutionary computations, genetic algorithms, particle swarm optimization, fuzzy and rough systems. Additionally there is also a set of papers devoted to clustering and classification. The second volume is mainly concerned with neural networks theory and applications, support vector machines, biomedical and biometrics applications, computer vision, control and robotics.

ICANNGA 2007 enjoyed plenary lectures presented by distinguished scientists: Shun-ichi Amari from Japan, Ryszard Tadeusiewicz and Janusz Kacprzyk from Poland, Kevin Warwick and Rafal Zbikowski from England.

We would like to thank the International Advisory Committee for their guidance, advice and discussions. Our special gratitude is devoted to the Program Committee and reviewers. They have done a wonderful job of shaping the conference image.

Camera-ready version of the papers were carefully examined and verified by Wiktor Malesza, Konrad Markowski, Tomasz Toczyski and Maciej Twardy. A number of people from our Electrical Engineering Faculty, the Control Division Staff members and the PhD students were involved in various conference tasks, supporting the conference secretariat and maintaining multimedia equipment. We greatly appreciate all they have done.

We also wish to thank our publisher, especially Alfred Hofmann the Editor-in-Chief of LNCS and Anna Kramer for their support and collaboration.

Finally, the conference was made up of papers and presentations prepared by our contributors and participants. Most of our gratitude is directed to them.

April 2007

Bartłomiej Beliczynski
Andrzej Dzielinski
Marcin Iwanowski
Bernardete Ribeiro

Organization

Advisory Committee

Rudolf Albrecht, University of Innsbruck, Austria
Andrej Dobnikar, University of Ljubljana, Slovenia
Vera Kurkova, Academy of Sciences of the Czech Republic, Czech Republic
David Pearson, University Jean Monnet, France
Bernardete Ribeiro, University of Coimbra, Portugal
Nigel Steele, Coventry University, UK

Program Committee

Bartłomiej Beliczynski, Poland (Chair)	Vera Kurkova, Czech Republic
Rudolf Albrecht, Austria	Pedro Larranaga, Spain
Gabriela Andrejkova, Slovakia	Francesco Masulli, Italy
Paulo de Carvalho, Portugal	Leila Mokhnache, Algeria
Ernesto Costa, Portugal	Roman Neruda, Czech Republic
Andrej Dobnikar, Slovenia	Stanislaw Osowski, Poland
Marco Dorigo, Belgium	Nikola Pavesic, Slovenia
Antonio Dourado, Portugal	David Pearson, France
Gerard Dray, France	Maria Pietrzak-David, France
Andrzej Dzielinski, Poland	Colin Reeves, UK
Jorge Henriques, Portugal,	Bernardete Ribeiro, Portugal
Katerina Hlavackova-Schindler, Austria	Henrik Saxen, Finland
Osamu Hoshino, Japan	Marcello Sanguineti, Italy
Janusz Kacprzyk, Poland	Jiri Sima, Czech Republic
Tadeusz Kaczorek, Poland	Catarina Silva, Portugal
Paul C. Kainen, USA	Nigel Steele, UK
Helen Karatza, Greece	Mirosław Swiercz, Poland
Miroslav Karny, Czech Republic	Ryszard Tadeusiewicz, Poland
Marian P.Kazmierkowski Poland	Tatiana Tambouratzis, Greece
Mario Koeppen, Germany	Kevin Warwick, UK
Jozef Korbicz, Poland	Stanislaw H. Zak, USA

Organizing Committee

Bartłomiej Beliczynski (Chair)
Bernardete Ribeiro (Past Chair)
Witold Czajewski (Technical Support, Conference Events)
Andrzej Dzielinski (Reviewing Process)
Waldemar Graniszewski (Social Program)
Marcin Iwanowski (Conference Coordinator; Proceedings, WWW)
Grazyna Rabij (Finances)

Reviewers

Rudolf Albrecht	Soowhan Han
Krzysztof Amborski	Zenon Hendzel
Gabriela Andrejkova	Jorge Henriques
Jaroslav Arabas	Mika Hirvensalo
Piotr Arabas	Katarina Hlavackova-Schindler
Prasanna Balaprakash	Osamu Hoshino
Bartłomiej Beliczynski	Yanhai Hu
Conrad Bielski	Ben Hutt
Fatih Mehmet Botsali	Naohiro Ishii
Cyril Brom	Marcin Iwanowski
Pawel Buczynski	Wojciech Jedruch
Paulo de Carvalho	Tatiana Jaworska
Hasan Huseyin Celik	Piotr Jedrzejowicz
Leszek Chmielewski	Sangbae Jeong
YoungSik Choi	Marcel Jirina
Michal Choras	Tomasz Kacprzak
Ryszard Choras	Janusz Kacprzyk
Gyo-Bum Chung	Tadeusz Kaczorek
Andrzej Cichocki	Paul C. Kainen
Ernesto Costa	Helen Karatza
David Coufal	Andrzej Karbowski
Boguslaw Cyganek	Ali Karci
Witold Czajewski	Miroslav Karny
Włodzimierz Dabrowski	Włodzimierz Kasprzak
Dariusz Krol	Marian P. Kazmierkowski
Guy De Tre	Adnan Khashman
Andrzej Dobnikar	Chang-Soo Kim
Antonio Dourado	Il-Hwan Kim
Gerard Dray	Kwang-Baek Kim
Andrzej Dzielinski	Mi-Young Kim
Mehmet Onder Efe	Mario Koeppen
Maria Ganzha	Jozef Korbicz
Waldemar Graniszewski	Anna Korzynska

Jacek Kozak
Wojciech Kozinski
Marek Kowal
Petra Kudova
Piotr Kulczycki
Vera Kurkova
Halina Kwasnicka
Bogdan Kwolek
Pedro Larranaga
Inbok Lee
Kidong Lee
Jun-Seok Lim
Hong-Dar Lin
Rafal Lopatka
Jacek Mandziuk
Mariusz Mlynarczyk
Mariusz Malinowski
Marcin Mrugalski
Konrad Markowski
Francesco Masulli
Yuri Merkuryev
Zbigniew Mikrut
Leila Mokhanchek
Marco Montes de Oca
Jose Moreno
Nadia Nedjah
Roman Neruda
Mariusz Nieniewski
Joanna Nowak
Piotr Nowak
Marek Ogiela
Włodzimierz Ogryczak
Stanisław Osowski
Andrzej Pacut
Henryk Palus
Marcin Paprzycki
Byung Joo Park
JungYong Park
Kiejn Park
Miroslaw Parol
Krzysztof Patan
Nikola Pavesic
David W. Pearson
Daniel Prusa
Artur Przelaskowski

Jochen Radmer
Remigiusz Rak
Sarunas Raudys
Kiril Ribarov
Bernardete Ribeiro
Martin Rimnac
Claudio M. Rocco S.
Miguel Rocha
Przemyslaw Rokita
Maciej Romaniuk
Maciej Slawinski
Stanislav Saic
Marcello Sanguineti
José Santos Reyes
Henrik Saxen
Franciszek Seredynski
Dongmin Shin
Barbara Siemiatkowska
Dominik Sierociuk
Catarina Silva
Jiri Sima
Slawomir Skoneczny
Andrzej Sluzek
Czeslaw Smutnicki
Pierre Soille
Oleksandr Sokolov
Nigel Steele
Barbara Strug
Pawel Strumillo
Bartłomiej Sulikowski
Miroslaw Swiercz
Krzysztof Szczypiorski
Jarosaw Szostakowski
Wojciech Szynkiewicz
Ryszard Tadeusiewicz
Tatiana Tambouratzis
Jorge Tavares
Tomasz Toczyski
Krzysztof Trojanowski
George A. Tsihrintzis
Pavel Vacha
Armando Vieira
Wen-Pai Wang
Slawomir Wierzchon
Anna Wilbik

Marcin Witczak
Maciej Wygralak
Mykhaylo Yatsymirskyy
Slawomir Zadrozny

Cezary Zielinski
Stanislaw H. Zak

Organizers

ICANNGA 2007 was organized by the Control Division of the Institute of Control and Industrial Electronics, Faculty of Electrical Engineering, Warsaw University of Technology, Poland.

Lecture Notes in Computer Science

For information about Vols. 1–4342

please contact your bookseller or Springer

Vol. 4453: T. Speed, H. Huang (Eds.), *Research in Computational Molecular Biology*. XVI, 550 pages. 2007. (Sublibrary LNBI).

Vol. 4448: M. Giacobini (Ed.), *Applications of Evolutionary Computing*. XXIII, 755 pages. 2007.

Vol. 4447: E. Marchiori, J.H. Moore, J.C. Rajapakse (Eds.), *Evolutionary Computation, Machine Learning and Data Mining in Bioinformatics*. XI, 302 pages. 2007.

Vol. 4446: C. Cotta, J. van Hemert (Eds.), *Evolutionary Computation in Combinatorial Optimization*. XII, 241 pages. 2007.

Vol. 4445: M. Ebner, M. O'Neill, A. Ekárt, L. Vanneschi, A.I. Esparcia-Alcázar (Eds.), *Genetic Programming*. XI, 382 pages. 2007.

Vol. 4444: T. Reps, M. Sagiv, J. Bauer (Eds.), *Program Analysis and Compilation, Theory and Practice*. X, 361 pages. 2007.

Vol. 4443: R. Kotagiri, P.R. Krishna, M.K. Mohania, E. Nantajeewarawat (Eds.), *Advances in Databases: Concepts, Systems and Applications*. XXI, 1126 pages. 2007.

Vol. 4432: B. Beliczynski, A. Dzielinski, M. Iwanowski, B. Ribeiro (Eds.), *Adaptive and Natural Computing Algorithms*, Part II. XXVI, 761 pages. 2007.

Vol. 4431: B. Beliczynski, A. Dzielinski, M. Iwanowski, B. Ribeiro (Eds.), *Adaptive and Natural Computing Algorithms*, Part I. XXV, 851 pages. 2007.

Vol. 4430: C.C. Yang, D. Zeng, M. Chau, K. Chang, Q. Yang, X. Cheng, J. Wang, F.-Y. Wang, H. Chen (Eds.), *Intelligence and Security Informatics*. XII, 330 pages. 2007.

Vol. 4429: R. Lu, J.H. Siekmann, C. Ullrich (Eds.), *Cognitive Systems*. X, 161 pages. 2007. (Sublibrary LNAI).

Vol. 4427: S. Uhlig, K. Papagiannaki, O. Bonaventure (Eds.), *Passive and Active Network Measurement*. XI, 274 pages. 2007.

Vol. 4425: G. Amati, C. Carpineto, G. Romano (Eds.), *Advances in Information Retrieval*. XIX, 759 pages. 2007.

Vol. 4424: O. Grumberg, M. Huth (Eds.), *Tools and Algorithms for the Construction and Analysis of Systems*. XX, 738 pages. 2007.

Vol. 4423: H. Seidl (Ed.), *Foundations of Software Science and Computational Structures*. XVI, 379 pages. 2007.

Vol. 4422: M.B. Dwyer, A. Lopes (Eds.), *Fundamental Approaches to Software Engineering*. XV, 440 pages. 2007.

Vol. 4421: R. De Nicola (Ed.), *Programming Languages and Systems*. XVII, 538 pages. 2007.

Vol. 4420: S. Krishnamurthi, M. Odersky (Eds.), *Compiler Construction*. XIV, 233 pages. 2007.

Vol. 4419: P.C. Diniz, E. Marques, K. Bertels, M.M. Fernandes, J.M.P. Cardoso (Eds.), *Reconfigurable Computing: Architectures, Tools and Applications*. XIV, 391 pages. 2007.

Vol. 4418: A. Gagalowicz, W. Philips (Eds.), *Computer Vision/Computer Graphics Collaboration Techniques*. XV, 620 pages. 2007.

Vol. 4416: A. Bemporad, A. Bicchi, G. Buttazzo (Eds.), *Hybrid Systems: Computation and Control*. XVII, 797 pages. 2007.

Vol. 4415: P. Lukowicz, L. Thiele, G. Tröster (Eds.), *Architecture of Computing Systems - ARCS 2007*. X, 297 pages. 2007.

Vol. 4414: S. Hochreiter, R. Wagner (Eds.), *Bioinformatics Research and Development*. XVI, 482 pages. 2007. (Sublibrary LNBI).

Vol. 4412: F. Stajano, H.J. Kim, J.-S. Chae, S.-D. Kim (Eds.), *Ubiquitous Convergence Technology*. XI, 302 pages. 2007.

Vol. 4410: A. Branco (Ed.), *Anaphora: Analysis, Algorithms and Applications*. X, 191 pages. 2007. (Sublibrary LNAI).

Vol. 4407: G. Puebla (Ed.), *Logic-Based Program Synthesis and Transformation*. VIII, 237 pages. 2007.

Vol. 4406: W. De Meuter (Ed.), *Advance in Smaltalk*. VII, 157 pages. 2007.

Vol. 4405: L. Padgham, F. Zambonelli (Eds.), *Agent-Oriented Software Engineering VII*. XII, 225 pages. 2007.

Vol. 4403: S. Obayashi, K. Deb, C. Poloni, T. Hiroyasu, T. Murata (Eds.), *Evolutionary Multi-Criterion Optimization*. XIX, 954 pages. 2007.

Vol. 4400: J.F. Peters, A. Skowron, V.W. Marek, E. Orłowska, R. Slowinski, W. Ziarko (Eds.), *Transactions on Rough Sets VII, Part II*. X, 381 pages. 2007.

Vol. 4399: T. Kovacs, X. Llorà, K. Takadama, P.L. Lanzi, W. Stolzmann, S.W. Wilson (Eds.), *Learning Classifier Systems*. XII, 345 pages. 2007. (Sublibrary LNAI).

Vol. 4398: S. Marchand-Maillet, E. Bruno, A. Nürnberger, M. Detyniecki (Eds.), *Adaptive Multimedia Retrieval: User, Context, and Feedback*. XI, 269 pages. 2007.

Vol. 4397: C. Stephanidis, M. Pieper (Eds.), *Universal Access in Ambient Intelligence Environments*. XV, 467 pages. 2007.

Vol. 4396: J. García-Vidal, L. Cerdà-Alabern (Eds.), *Wireless Systems and Mobility in Next Generation Internet*. IX, 271 pages. 2007.

- Vol. 4395: M. Daydé, J.M.L.M. Palma, Á.L.G.A. Coutinho, E. Pacitti, J.C. Lopes (Eds.), High Performance Computing for Computational Science - VEC-
PAR 2006. XXIV, 721 pages. 2007.
- Vol. 4394: A. Gelbukh (Ed.), Computational Linguistics and Intelligent Text Processing. XVI, 648 pages. 2007.
- Vol. 4393: W. Thomas, P. Weil (Eds.), STACS 2007. XVIII, 708 pages. 2007.
- Vol. 4392: S.P. Vadhan (Ed.), Theory of Cryptography. XI, 595 pages. 2007.
- Vol. 4391: Y. Stylianou, M. Faundez-Zanuy, A. Esposito (Eds.), Progress in Nonlinear Speech Processing. XII, 269 pages. 2007.
- Vol. 4390: S.O. Kuznetsov, S. Schmidt (Eds.), Formal Concept Analysis. X, 329 pages. 2007. (Sublibrary LNAI).
- Vol. 4389: D. Weyns, H.V.D. Parunak, F. Michel (Eds.), Environments for Multi-Agent Systems III. X, 273 pages. 2007. (Sublibrary LNAI).
- Vol. 4385: K. Coninx, K. Luyten, K.A. Schneider (Eds.), Task Models and Diagrams for Users Interface Design. XI, 355 pages. 2007.
- Vol. 4384: T. Washio, K. Satoh, H. Takeda, A. Inokuchi (Eds.), New Frontiers in Artificial Intelligence. IX, 401 pages. 2007. (Sublibrary LNAI).
- Vol. 4383: E. Bin, A. Ziv, S. Ur (Eds.), Hardware and Software, Verification and Testing. XII, 235 pages. 2007.
- Vol. 4381: J. Akiyama, W.Y.C. Chen, M. Kano, X. Li, Q. Yu (Eds.), Discrete Geometry, Combinatorics and Graph Theory. XI, 289 pages. 2007.
- Vol. 4380: S. Spaccapietra, P. Atzeni, F. Fages, M.-S. Hacid, M. Kifer, J. Mylopoulos, B. Pernici, P. Shvaiko, J. Trujillo, I. Zaihrayev (Eds.), Journal on Data Semantics VIII. XV, 219 pages. 2007.
- Vol. 4378: I. Virbitskaite, A. Voronkov (Eds.), Perspectives of Systems Informatics. XIV, 496 pages. 2007.
- Vol. 4377: M. Abe (Ed.), Topics in Cryptology - CT-RSA 2007. XI, 403 pages. 2006.
- Vol. 4376: E. Frachtenberg, U. Schwiegelshohn (Eds.), Job Scheduling Strategies for Parallel Processing. VII, 257 pages. 2007.
- Vol. 4374: J.F. Peters, A. Skowron, I. Düntsch, J. Grzymala-Busse, E. Orlowska, L. Polkowski (Eds.), Transactions on Rough Sets VI, Part I. XII, 499 pages. 2007.
- Vol. 4373: K. Langendoen, T. Voigt (Eds.), Wireless Sensor Networks. XIII, 358 pages. 2007.
- Vol. 4372: M. Kaufmann, D. Wagner (Eds.), Graph Drawing. XIV, 454 pages. 2007.
- Vol. 4371: K. Inoue, K. Satoh, F. Toni (Eds.), Computational Logic in Multi-Agent Systems. X, 315 pages. 2007. (Sublibrary LNAI).
- Vol. 4370: P.P. Lévy, B. Le Grand, F. Poulet, M. Soto, L. Darago, L. Toubiana, J.-F. Vibert (Eds.), Pixelization Paradigm. XV, 279 pages. 2007.
- Vol. 4369: M. Umeda, A. Wolf, O. Bartenstein, U. Geske, D. Seipel, O. Takata (Eds.), Declarative Programming for Knowledge Management. X, 229 pages. 2006. (Sublibrary LNAI).
- Vol. 4368: T. Erlebach, C. Kaklamanis (Eds.), Approximation and Online Algorithms. X, 345 pages. 2007.
- Vol. 4367: K. De Bosschere, D. Kaeli, P. Stenström, D. Whalley, T. Ungerer (Eds.), High Performance Embedded Architectures and Compilers. XI, 307 pages. 2007.
- Vol. 4366: K. Tuyls, R. Westra, Y. Saeys, A. Nowé (Eds.), Knowledge Discovery and Emergent Complexity in Bioinformatics. IX, 183 pages. 2007. (Sublibrary LNBI).
- Vol. 4364: T. Kühne (Ed.), Models in Software Engineering. XI, 332 pages. 2007.
- Vol. 4362: J. van Leeuwen, G.F. Italiano, W. van der Hoek, C. Meinel, H. Sack, F. Plášil (Eds.), SOFSEM 2007: Theory and Practice of Computer Science. XXI, 937 pages. 2007.
- Vol. 4361: H.J. Hoogeboom, G. Păun, G. Rozenberg, A. Salomaa (Eds.), Membrane Computing. IX, 555 pages. 2006.
- Vol. 4360: W. Dubitzky, A. Schuster, P.M.A. Sloot, M. Schroeder, M. Romberg (Eds.), Distributed, High-Performance and Grid Computing in Computational Biology. X, 192 pages. 2007. (Sublibrary LNBI).
- Vol. 4358: R. Vidal, A. Heyden, Y. Ma (Eds.), Dynamical Vision. IX, 329 pages. 2007.
- Vol. 4357: L. Buttyán, V. Gligor, D. Westhoff (Eds.), Security and Privacy in Ad-Hoc and Sensor Networks. X, 193 pages. 2006.
- Vol. 4355: J. Julliand, O. Kouchnarenko (Eds.), B 2007: Formal Specification and Development in B. XIII, 293 pages. 2006.
- Vol. 4354: M. Hanus (Ed.), Practical Aspects of Declarative Languages. X, 335 pages. 2006.
- Vol. 4353: T. Schwentick, D. Suciu (Eds.), Database Theory - ICDT 2007. XI, 419 pages. 2006.
- Vol. 4352: T.-J. Cham, J. Cai, C. Dorai, D. Rajan, T.-S. Chua, L.-T. Chia (Eds.), Advances in Multimedia Modeling, Part II. XVIII, 743 pages. 2006.
- Vol. 4351: T.-J. Cham, J. Cai, C. Dorai, D. Rajan, T.-S. Chua, L.-T. Chia (Eds.), Advances in Multimedia Modeling, Part I. XIX, 797 pages. 2006.
- Vol. 4349: B. Cook, A. Podelski (Eds.), Verification, Model Checking, and Abstract Interpretation. XI, 395 pages. 2007.
- Vol. 4348: S.T. Taft, R.A. Duff, R.L. Brukardt, E. Ploedereder, P. Leroy (Eds.), Ada 2005 Reference Manual. XXII, 765 pages. 2006.
- Vol. 4347: J. Lopez (Ed.), Critical Information Infrastructures Security. X, 286 pages. 2006.
- Vol. 4346: L. Brim, B. Haverkort, M. Leucker, J. van de Pol (Eds.), Formal Methods: Applications and Technology. X, 363 pages. 2007.
- Vol. 4345: N. Maglaveras, I. Chouvarda, V. Koutkias, R. Brause (Eds.), Biological and Medical Data Analysis. XIII, 496 pages. 2006. (Sublibrary LNBI).
- Vol. 4344: V. Gruhn, F. Oquendo (Eds.), Software Architecture. X, 245 pages. 2006.

Table of Contents – Part II

Neural Networks

Evolution of Multi-class Single Layer Perceptron	1
<i>Sarunas Raudys</i>	
Estimates of Approximation Rates by Gaussian Radial-Basis Functions	11
<i>Paul C. Kainen, Věra Kůrková, and Marcello Sanguineti</i>	
Least Mean Square vs. Outer Bounding Ellipsoid Algorithm in Confidence Estimation of the GMDH Neural Networks	19
<i>Marcin Mrugalski and Józef Korbicz</i>	
On Feature Extraction Capabilities of Fast Orthogonal Neural Networks	27
<i>Bartłomiej Stasiak and Mykhaylo Yatsymirskyy</i>	
Neural Computations by Asymmetric Networks with Nonlinearities	37
<i>Naohiro Ishii, Toshinori Deguchi, and Masashi Kawaguchi</i>	
Properties of the Hermite Activation Functions in a Neural Approximation Scheme	46
<i>Bartłomiej Beliczynski</i>	
Study of the Influence of Noise in the Values of a Median Associative Memory	55
<i>Humberto Sossa, Ricardo Barrón, and Roberto A. Vázquez</i>	
Impact of Learning on the Structural Properties of Neural Networks	63
<i>Branko Šter, Ivan Gabrijel, and Andrej Dobnikar</i>	
Learning Using a Self-building Associative Frequent Network	71
<i>Jin-Guk Jung, Mohammed Nazim Uddin, and Geun-Sik Jo</i>	
Proposal of a New Conception of an Elastic Neural Network and Its Application to the Solution of a Two-Dimensional Travelling Salesman Problem	80
<i>Tomasz Szatkiewicz</i>	
Robust Stability Analysis for Delayed BAM Neural Networks	88
<i>Yijiang Wang and Zhiqiang Zuo</i>	
A Study into the Improvement of Binary Hopfield Networks for Map Coloring	98
<i>Gloria Galán-Marín, Enrique Mérida-Casermeyro, Domingo López-Rodríguez, and Juan M. Ortiz-de-Lazcano-Lobato</i>	

Automatic Diagnosis of the Footprint Pathologies Based on Neural Networks	107
<i>Marco Mora, Mary Carmen Jarur, and Daniel Sbarbaro</i>	
Mining Data from a Metallurgical Process by a Novel Neural Network Pruning Method	115
<i>Henrik Saxén, Frank Pettersson, and Matias Waller</i>	
Dynamic Ridge Polynomial Neural Networks in Exchange Rates Time Series Forecasting	123
<i>Rozaida Ghazali, Abir Jaafar Hussain, Dhiya Al-Jumeily, and Madjid Merabti</i>	
Neural Systems for Short-Term Forecasting of Electric Power Load	133
<i>Michał Bąk and Andrzej Bielecki</i>	
Jet Engine Turbine and Compressor Characteristics Approximation by Means of Artificial Neural Networks	143
<i>Maciej Lawryńczuk</i>	
Speech Enhancement System Based on Auditory System and Time-Delay Neural Network	153
<i>Jae-Seung Choi and Seung-Jin Park</i>	
Recognition of Patterns Without Feature Extraction by GRNN	161
<i>Övünç Polat and Tülay Yıldıırım</i>	
Real-Time String Filtering of Large Databases Implemented Via a Combination of Artificial Neural Networks	169
<i>Tatiana Tambouratzis</i>	
Parallel Realizations of the SAMANN Algorithm	179
<i>Sergejus Ivanikovas, Viktor Medvedev, and Gintautas Dzemyda</i>	
A POD-Based Center Selection for RBF Neural Network in Time Series Prediction Problems	189
<i>Wenbo Zhang, Xinchun Guo, Chaoyong Wang, and Chunguo Wu</i>	

Support Vector Machines

Support, Relevance and Spectral Learning for Time Series	199
<i>Bernardete Ribeiro</i>	
Support Vector Machine Detection of Peer-to-Peer Traffic in High-Performance Routers with Packet Sampling	208
<i>Francisco J. González-Castaño, Pedro S. Rodríguez-Hernández, Rafael P. Martínez-Álvarez, and Andrés Gómez-Tato</i>	
Improving SVM Performance Using a Linear Combination of Kernels ...	218
<i>Laura Dioşan, Mihai Oltean, Alexandrina-Rogozan, and Jean-Pierre Pecuchet</i>	
Boosting RVM Classifiers for Large Data Sets	228
<i>Catarina Silva, Bernardete Ribeiro, and Andrew H. Sung</i>	

Multi-class Support Vector Machines Based on Arranged Decision Graphs and Particle Swarm Optimization for Model Selection	238
<i>Javier Acevedo, Saturnino Maldonado, Philip Siegmann, Sergio Lafuente, and Pedro Gil</i>	
Applying Dynamic Fuzzy Model in Combination with Support Vector Machine to Explore Stock Market Dynamism	246
<i>Deng-Yiv Chiu and Ping-Jie Chen</i>	
Predicting Mechanical Properties of Rubber Compounds with Neural Networks and Support Vector Machines	254
<i>Mira Trebar and Uroš Lotrič</i>	
An Evolutionary Programming Based SVM Ensemble Model for Corporate Failure Prediction	262
<i>Lean Yu, Kin Keung Lai, and Shouyang Wang</i>	
Biomedical Signal and Image Processing	
Novel Multi-layer Non-negative Tensor Factorization with Sparsity Constraints	271
<i>Andrzej Cichocki, Rafal Zdunek, Seungjin Choi, Robert Plemmons, and Shun-ichi Amari</i>	
A Real-Time Adaptive Wavelet Transform-Based QRS Complex Detector	281
<i>Marek Rudnicki and Paweł Strumiłło</i>	
Nucleus Classification and Recognition of Uterine Cervical Pap-Smears Using FCM Clustering Algorithm	290
<i>Kwang-Baek Kim, Sungshin Kim, and Gwang-Ha Kim</i>	
Rib Suppression for Enhancing Frontal Chest Radiographs Using Independent Component Analysis	300
<i>Bilal Ahmed, Tahir Rasheed, Mohammed A.U. Khan, Seong Jin Cho, Sungyoung Lee, and Tae-Seong Kim</i>	
A Novel Hand-Based Personal Identification Approach	309
<i>Miao Qi, Yinghua Lu, Hongzhi Li, Rujuan Wang, and Jun Kong</i>	
White Blood Cell Automatic Counting System Based on Support Vector Machine	318
<i>Tomasz Markiewicz, Stanisław Osowski, and Bożena Mariańska</i>	
Kernels for Chemical Compounds in Biological Screening	327
<i>Karol Kozak, Marta Kozak, and Katarzyna Stapor</i>	
A Hybrid Automated Detection System Based on Least Square Support Vector Machine Classifier and k -NN Based Weighted Pre-processing for Diagnosing of Macular Disease	338
<i>Kemal Polat, Sadık Kara, Aysegül Güven, and Salih Güneş</i>	

Analysis of Microscopic Mast Cell Images Based on Network of Synchronised Oscillators	346
<i>Michał Strzelecki, Hyongsuk Kim, Paweł Liberski, and Anna Zalewska</i>	
Detection of Gene Expressions in Microarrays by Applying Iteratively Elastic Neural Net	355
<i>Máx Chacón, Marcos Lévano, Héctor Allende, and Hans Nowak</i>	
A New Feature Selection Method for Improving the Precision of Diagnosing Abnormal Protein Sequences by Support Vector Machine and Vectorization Method	364
<i>Eun-Mi Kim, Jong-Cheol Jeong, Ho-Young Pae, and Bae-Ho Lee</i>	
Epileptic Seizure Prediction Using Lyapunov Exponents and Support Vector Machine	373
<i>Bartosz Świdorski, Stanisław Osowski, Andrzej Cichocki, and Andrzej Rysz</i>	
Classification of Pathological and Normal Voice Based on Linear Discriminant Analysis	382
<i>Ji-Yeoun Lee, SangBae Jeong, and Minsoo Hahn</i>	
Efficient 1D and 2D Daubechies Wavelet Transforms with Application to Signal Processing	391
<i>Piotr Lipiński and Mykhaylo Yatsymirskyy</i>	
A Branch and Bound Algorithm for Matching Protein Structures	399
<i>Janez Konc and Dušanka Janežič</i>	

Biometrics

Multimodal Hand-Palm Biometrics	407
<i>Ryszard S. Choraś and Michał Choraś</i>	
A Study on Iris Feature Watermarking on Face Data	415
<i>Kang Ryoung Park, Dae Sik Jeong, Byung Jun Kang, and Eui Chul Lee</i>	
Keystroke Dynamics for Biometrics Identification	424
<i>Michał Choraś and Piotr Mroczkowski</i>	
Protecting Secret Keys with Fuzzy Fingerprint Vault Based on a 3D Geometric Hash Table	432
<i>Sungju Lee, Daesung Moon, Seunghwan Jung, and Yongwha Chung</i>	
Face Recognition Based on Near-Infrared Light Using Mobile Phone	440
<i>Song-yi Han, Hyun-Ae Park, Dal-ho Cho, Kang Ryoung Park, and Sangyoun Lee</i>	
NEU-FACES: A Neural Network-Based Face Image Analysis System ...	449
<i>Ioanna-Ourania Stathopoulou and George A. Tsihrintzis</i>	

GA-Based Iris/Sclera Boundary Detection for Biometric Iris Identification	457
<i>Tatiana Tambouratzis and Michael Masouris</i>	
Neural Network Based Recognition by Using Genetic Algorithm for Feature Selection of Enhanced Fingerprints.....	467
<i>Adem Alpaslan Altun and Novruz Allahverdi</i>	

Computer Vision

Why Automatic Understanding?	477
<i>Ryszard Tadeusiewicz and Marek R. Ogiela</i>	
Automatic Target Recognition in SAR Images Based on a SVM Classification Scheme	492
<i>Wolfgang Middelmann, Alfons Ebert, and Ulrich Thoennessen</i>	
Adaptive Mosaicing: Principle and Application to the Mosaicing of Large Image Data Sets	500
<i>Conrad Bielski and Pierre Soille</i>	
Circular Road Signs Recognition with Affine Moment Invariants and the Probabilistic Neural Classifier	508
<i>Bogusław Cyganek</i>	
A Context-Driven Bayesian Classification Method for Eye Location	517
<i>Eun Jin Koh, Mi Young Nam, and Phill Kyu Rhee</i>	
Computer-Aided Vision System for Surface Blemish Detection of LED Chips	525
<i>Hong-Dar Lin, Chung-Yu Chung, and Singa Wang Chiu</i>	
Detection of Various Defects in TFT-LCD Polarizing Film	534
<i>Sang-Wook Sohn, Dae-Young Lee, Hun Choi, Jae-Won Suh, and Hyeon-Deok Bae</i>	
Dimensionality Problem in the Visualization of Correlation-Based Data	544
<i>Gintautas Dzemyda and Olga Kurasova</i>	
A Segmentation Method for Digital Images Based on Cluster Analysis	554
<i>Héctor Allende, Carlos Becerra, and Jorge Galbiati</i>	
Active Shape Models and Evolution Strategies to Automatic Face Morphing	564
<i>Vittorio Zanella, Héctor Vargas, and Lorna V. Rosas</i>	
Recognition of Shipping Container Identifiers Using ART2-Based Quantization and a Refined RBF Network	572
<i>Kwang-Baek Kim, Minhwan Kim, and Young Woon Woo</i>	

A Local-Information-Based Blind Image Restoration Algorithm Using a MLP	582
<i>Hui Wang, Nian Cai, Ming Li, and Jie Yang</i>	
Reflective Symmetry Detection Based on Parallel Projection	590
<i>Ju-Whan Song and Ou-Bong Gwon</i>	
Detail-Preserving Regularization Based Removal of Impulse Noise from Highly Corrupted Images	599
<i>Bogdan Kwolek</i>	
Fast Algorithm for Order Independent Binary Homotopic Thinning	606
<i>Marcin Iwanowski and Pierre Soille</i>	
A Perturbation Suppressing Segmentation Technique Based on Adaptive Diffusion	616
<i>Wolfgang Middelmann, Alfons Ebert, Tobias Deißler, and Ulrich Thoennessen</i>	
Weighted Order Statistic Filters for Pattern Detection	624
<i>Slawomir Skoneczny and Dominik Cieslik</i>	
Real-Time Image Segmentation for Visual Servoing	633
<i>Witold Czajewski and Maciej Staniak</i>	

Control and Robotics

A Neural Framework for Robot Motor Learning Based on Memory Consolidation	641
<i>Heni Ben Amor, Shuhei Ikemoto, Takashi Minato, Bernhard Jung, and Hiroshi Ishiguro</i>	
Progressive Optimisation of Organised Colonies of Ants for Robot Navigation: An Inspiration from Nature	649
<i>Tatiana Tambouratzis</i>	
An Algorithm for Selecting a Group Leader in Mobile Robots Realized by Mobile Ad Hoc Networks and Object Entropy	659
<i>Sang-Chul Kim</i>	
Robot Path Planning in Kernel Space	667
<i>José Alí Moreno and Cristina García</i>	
A Path Finding Via VRML and VISION Overlay for Autonomous Robot	676
<i>Kil To Chong, Eun-Ho Son, Jong-Ho Park, and Young-Chul Kim</i>	
Neural Network Control for Visual Guidance System of Mobile Robot	685
<i>Young-Jae Ryoo</i>	
Cone-Realizations of Discrete-Time Systems with Delays	694
<i>Tadeusz Kaczorek</i>	