Lecture Notes in Computer Science 4507

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

Francisco Sandoval Alberto Prieto
Joan Cabestany Manuel Graña (Eds.)

Computational and Ambient Intelligence

9th International Work-Conference on
Artificial Neural Networks, IWANN 2007
San Sebastián, Spain, June 20-22, 2007
Proceedings

Springer

Volume Editors

Francisco Sandoval
Universidad de Málaga. E.T.S.I. de Telecomunicación
Campus Universitario de Teatinos, 29071 Málaga, Spain
E-mail: sandoval@dte.uma.es

Alberto Prieto
Universidad de Granada. E.T.S.I. de Informática y de Telecomunicación
Periodista Daniel Saucedo, s/n, E18071 Granada, Spain
E-mail: aprieto@ugr.es

Joan Cabestany
Universitat Politècnica de Catalunya (UPC). E.T.S.I. de Telecomunicación
Campus Norte, Edificio C4, C/ Jordi Girona, 1-3, E08034 Barcelona, Spain
E-mail: cabestan@eel.upc.es

Manuel Graña
University of the Basque Country, Facultad de Informática
Paseo Manuel de Lardizabal, San Sebastian 20018, Spain
E-mail: ccpgrrom@si.ehu.es

Library of Congress Control Number: 2007928733

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

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

ISSN 0302-9743
ISBN-10 3-540-73006-0 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-73006-4 Springer Berlin Heidelberg New York

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12074884 06/3180 5 4 3 2 1 0

Preface

We present in this volume the collection of finally accepted papers for the ninth edition of the IWANN conference ("International Work-Conference on Artificial Neural Networks"). This biennial meeting focuses on the foundations, theory, models and applications of systems inspired by nature (neural networks, fuzzy logic and evolutionary systems).

Since the first edition of IWANN in Granada (LNCS 540, 1991), the computational intelligence community and the domain itself have matured and evolved. Under the computational intelligent banner we find a very heterogeneous scenario with a main interest and objective: to better understand nature and natural entities for the correct elaboration of theories, models and new algorithms. For scientifics, engineers and professionals working in the area, this is a very good way to get real, solid and competitive applications.

More and more, these new computational techniques are used in applications that try to bring a new situation of well-being to the user. The conjunction of a more and more miniaturized hardware together with the growing computational intelligence embodied in this hardware leads us towards fully integrated embedded systems-on-a-chip and opens the door for truly ubiquitous electronics.

In this IWANN edition we have tried to bring computational intelligence closer to the ambient one, looking for environments that are sensitive, adaptive and responsive to the presence of people and objects, where technology is embedded, hidden in the background; environments that augment activities through smart nonexplicit assistance; environments that preserve security, privacy and trustworthiness while utilizing information when needed and when appropriate (Fred Boekhorst, Philips, ISSCC02).

The above concepts were the main reason for choosing the subtitle of the IWANN 2007 edition: *"Computational and Ambient Intelligence***."** The call for papers addressed the following topics:

1. **Mathematical and theoretical methods in computational intelligence.** Complex and social systems. Evolutionary and genetic algorithms. Fuzzy logic. Mathematics for neural networks. RBF structures. Self-organizing networks and methods. Support vector machines.
2. **Neurocomputational formulations.** Single-neuron modelling. Perceptual modelling. System-level neural modelling. Spiking neurons. Models of biological learning.
3. **Learning and adaptation.** Adaptive systems. Imitation learning. Reconfigurable systems. Supervised, non-supervised, reinforcement and statistical algorithms.
4. **Emulation of cognitive functions.** Decision Making. Multi-agent systems. Sensor mesh. Natural language. Pattern recognition. Perceptual and motor function (visual, auditory, tactile, virtual reality, etc.). Robotics. Planning motor control.
5. **Bio-inspired systems and neuro-engineering.** Embedded intelligent systems. Evolvable computing. Evolving hardware. Microelectronics for neural,

fuzzy and bioinspired systems. Neural prostheses. Retinomorphic systems. Nanosystems. Nanocognitive Systems.

6. **Applications.** Adaptive interfaces. Ambient intelligent. Biomimetic applications. Data analysis and pre-processing. Data mining. Economy and financial engineering. Fuzzy systems for control. Internet. Neural networks for control. Power systems. Signal processing. Telecommunication applications. Time series and prediction.

After a careful review process of the more than 260 submissions, 145 papers were accepted for publication, including the contribution of three invited speakers. In this edition a special emphasis was put on the organization of special sessions. A total of 7 special sessions containing 51 papers were accepted for presentation, covering specific aspects like neural-inspired architectures for nanoelectronics, kernel methods, nature-inspired intelligent methods and applications, assistive technologies and e-health, etc. The review and selection process was done with the help and cooperation of the Special Session organizers. We would like to thank them for their effort and good work.

The organization of this book does not follow the scheme and the order of the above-mentioned main topics, but is organized in a rational way according to the contents of the accepted papers, going from the more abstract concepts to the concrete and applicable questions and considerations. The result is a 20-chapters volume with the following main parts:

1. Theoretical concepts and neurocomputational formulations
2. Inmproving models and learning procedures
3. Self-organizing networks
4. Kernel methods
5. Evolutionary and genetic algorithms
6. Evolutionary learning
7. Fuzzy systems
8. Neuroengineering and hardware implementations
9. Data analysis
10. Signal processing
11. Speech processing
12. Image processing
13. Time series and prediction
14. Robotics and planning motor control
15. Power system applications
16. Internet and Web applications
17. Biomedical applications
18. Neural networks and other machine learning methods in cancer research
19. Assistive technologies and e-health
20. Other applications

The IWANN 2007 edition was organized by the Spanish Chapter of the IEEE Computational Intelligence Society, the Universidad de Granada, the Universidad de Málaga, and the Universidad Politécnica de Catalunya. The Universidad del País

Vasco was mainly engaged in the local organization. Sponsorship was obtained from the Spanish Ministerio de Educación y Ciencia, Universidad del Pais Vasco grants, the City Council of San Sebastián and the Basc Government.

We would like to express our gratitude to the members of the IWANN Organizing Committee, and to all the people who participated in the event (delegates, invited speakers, special session organizers). The editors would like to mention the people who helped in the review process as special or additional reviewers.

Finally, we would like to thank Springer, and especially Alfred Hoffman and Anna Kramer, for their continuous support and cooperative work from the very beginning of the IWANN conferences.

June 2007

Francisco Sandoval
Alberto Prieto
Joan Cabestany
Manuel Graña

IWANN 2007 Chairs and Committees

Organizing Committee

Conference Chairs

Joan Cabestany (Univ. Pol. Catalunya, Spain)
Alberto Prieto (Univ. Granada, Spain)
Francisco Sandoval (Univ. Málaga, Spain)

Technical Program Chairs

Gonzalo Joya (Univ. Málaga, Spain)
Francisco García Lagos (Univ. Málaga, Spain)
Miguel Atencia (Univ. Málaga, Spain)

Publicity And Publication Chairs

Pedro Castillo (Univ. Granada, Spain)
Alberto Guillén (Univ. Granada, Spain)
Francisco Illeras (Univ. Granada, Spain)
Beatriz Prieto (Univ. Granada, Spain)

Registration And Local Arrangements Chairs

Manuel Graña (Univ. Basque Country, Spain)
Maite García-Sebastian (Univ. Basque Country, Spain)
Flavio Banterla (Univ. Basque Country, Spain)
Ivan Villaverde (Univ. Basque Country, Spain)
Miguel Angel Veganzones (Univ. Basque Country, Spain)
Jose Orlando Maldonado (Univ. Basque Country, Spain)
Andoni Beristain (Univ. Basque Country, Spain)
Ramón Moreno (Univ. Basque Country, Spain)
Alexancre Manhaes Savio (Univ. Basque Country, Spain)

Special Sessions Chairs

Juan-Manuel Moreno (Univ. Pol. Catalunya, Spain)
Jordi Madrenas (Univ. Pol. Catalunya, Spain)

Program Committee

Igor Aleksander, Imperial College, UK
Andreas Andreu, Johns Hopkins University, USA
Plamen Angelov, Univ. Lancaster, UK
Cecilio Angulo, Tech. Univ. Catalunya, Spain

Antonio Artés Rodríguez, Univ. Carlos III, Spain
Antonio Bahamonde, Univ. Oviedo, Gijón, Spain
Sergi Bermejo, Tech. Univ. Catalunya, Spain
Piero Bonissone, GE CRD Information Technology Laboratory , Schenectady, NY, USA
Andreu Catalá, Tech. Univ. Catalunya, Spain
Pert Cauwenberghs, The Johns Hopkins University, USA
Jesus Cid-Sueiro, Unv. Carlos III, Madrid, Spain
Carlos Cotta, Univ. Málaga, Spain
Marie Cottrell, Univ. Paris 1, France
Alicia d'Anjou, Univ. Pais Vasco (EHU), Spain
Javier de Lope, Tech. Univ. Madrid, Spain
Luiza de Macedo Mourelle, University of Rio de Janeiro, Brazil
Dante del Corso, Politécnico di Torino, Italy
Angel P. del Pobil, Univ. Jaume I, Castellón, Spain
Richard Duro, Univ. Coruña, Spain
Reinhard Eckhorn, Philipps-Univ., Germany
Marcos Faundez-Zanuy, Tech. Univ. Catalunya, Spain
J. Manuel Fernández, Univ. Polit. de Cartagena, Spain
Ramon Ferrer Cancho, Univ. of Rome, Italy
Heinrich Flar, Mikroelektronik, TU Berlin, Germany
Dario Floreano, Swiss NSF, EPFL, Switzerland
Jean-Claude Fort, Univ. Paul Sabatier Toulouse, France
Kunihiko Fukushima, Osaka Univ., Japan
Chistian Gamrat, CEA, Gif sur Yvette, France
Patrik Garda, Orsay, France
Karl Goser, Univ. Dortmund, Germany
Anne Guérin-Dugué, LIS, INPG, Grenoble, France
Alister Hamilton, Univ. Edinburgh, UK
Barbara Hammer, Univ. of Osnabrück, Germany
Martin Hasler, EPFL Lausanne, Switzerland
Jeanny Hérault, I.N.P.G. Grenoble, France
Francisco Herrera, Univ. Granada, Spain
Cesar Hervás, Univ. Cordoba, Spain
Tom Heskes, Univ. Nijmegen, The Netherlands
Giacomo Indiveri, Institute of Neuroinformatics ETH/UNIZ, Zurich, Switzerland
Pedro Isasi, Univ. Carlos III, Spain
Simon Jones, Univ. Loughborough, UK
Christian Jutten, I.N.P.G. Grenoble, France
Tin Kam Ho, Bell Labs, USA
Kathryn Klemic, Univ. of Yale, USA
Amaury Lendasse, Helsinki University of Technology, Finland
Kurosh Madani, Univ. of Paris-XII, France
Jordi Madrenas, Tech. Univ. Catalunya, Spain
Luis Magdalena, Tech. Univ. Madrid, Spain
Dario Maravall, Tech. Univ. Madrid, Spain
Bonifacio Martín del Brio, Univ. Zaragoza, Spain

Wolfgang Maass, Technische Universität Graz, Austria
Francesco Masulli, Univ. La Spiezia, Genova, Italy
Augusto Montisci, Univ. of Cagliari, Italy
Claudio Moraga, Dortmund University, Germany
Juan M. Moreno, Tech. Univ. Catalunya, Spain
Klaus-Robert Müller, Fraunhofer Institute, Berlin, Germany
José Muñoz, Univ. of Málaga, Spain
Alan F. Murray, Edinburgh University, UK
Jean-Pierre Nadal, Ecole Normale Supérieure Paris, France
Nadia Nedjah, State Univ. of Rio de Janeiro, Brazil
Erkki Oja, Helsinki Univ. of Technology, Finland
Julio Ortega, Univ. Granada, Spain
Kevin M. Passino, The Ohio State University USA
Witold Pedrycz, University of Alberta, Canada
Francisco José Pelayo, Univ. Granada, Spain
Andrés Perez-Uribe, Univ. of Applied Sc. of Western Switzerland, Switzerland
Vicenzo Piuiri, University of Milan, Italy
Carlos G. Puntonet, Univ. Granada, Spain
Leonardo Reyneri, Politecnico di Torino, Italy
Clemente Rodríguez Lafuente, Univ. Pais Vasco (EHU), Spain
Ignacio Rojas, Univ. Granada, Spain
Eduardo Ros, Univ. Granada, Spain
Ulrich Rückert, Heinz Nixdorf Institute, Univ. of Paderborn, Germany
Javier Ruiz-del-Solar, Univ. Chile, Chile
Eduardo Sanchez, LSI, EPFL, Switzerland
Juan V. Sanchez-Andrés, Univ. La Laguna, Spain
Juan A. Sigüenza, Univ. Autónoma de Madrid, Spain
Jordi Solé-Casals, Univ. de Vic, Spain
Peter Szolgay, Hungarian Academy of Sciences, Hungary
John Taylor, King's College London, UK
Fabian Theis, Institute of Biophysics, University of Regensburg, Germany
Carme Torras, IRI, CSIC, Tech. Univ. Catalunya, Spain
Joaquín Torres, Univ. of Granada, Spain
Mark Van Rossum, Univ. of Edinburgh, UK
Marley Vellasco, Pontif. Univ. Católica Rio de Janeiro, Brazil
Alfredo Vellido, Tech. Univ. Catalunya, Spain
Michel Verleysen, Univ. Cath. de Louvain-la-Neuve, Belgium
Thomas Villmann, Univ. of Leipzig, Germany
Changjiu Zhou, Singapore Polytechnic
Ahmed Zobaa, Univ. of Cairo, Egypt
Pedro Zufiria, Tech. Univ. Madrid, Spain

Invited Papers Authors

Jeanny Herault
Piero P. Bonissone
Vassilis G. Kaburlasos

Special Sessions Organizers

Cecilio Angulo
Roberta Annicchiarico
Andreu Català
Emilio Corchado
Marie Cottrell
Ulises Cortes
Ralf Eickhoff
Bogdan Gabrys
Paulo J.G. Lisboa
Ulrich Rückert
Ricardo Téllez
Alfredo Vellido
Michel Verleysen
Cristina Urdiales

Other Reviewers

André Abs
Amparo Alonso
Rene Alquezar
Matias Alvarado
Gabriela Andrejkova
Plamen Angelov
Mancia Anguita
Davide Anguita
Miguel Atencia
Javier Bajo
Marco Balsi
Flavio Banterla
Bruno Baruque
Andoni Beristain
Jose L. Bernier
Francesco Camastra
Angelo Cangelosi
Eduardo Casilari
Valentina Colla
Emilio Corchado
Ulises Cortés
Dieter Devlaminck
Fernando Diaz-de-Maria
Ralf Eickhoff
Frank Ellinger
Anibal R. Figueiras-Vidal
Karla Figueiredo
Arthur Flexer
Felipe M. França
Leonardo Franco
Juan M Garcia-Gomez
Francisco Garcia-Lagos
Nicolás García-Pedrajas
Maite Garcia-Sebastián
Paolo Gastaldo
Vanessa Gomez
Elisa Guerrero
Alberto Guillen
Luis J. Herrera
Alvaro Herrero
José M. Jerez
Stefanos Kollias
Constantine Kotropoulos
Jorma Laaksonen
Juan Lazo
Priscila Lima
Paulo Lisboa
Javier Macias-Guarasa
Christophe Marsala
Mario Martin
Humberto Martinez
José F. Martínez
José Martos
Juan J. Merelo
Antonio Moreno
Ramon Moreno
Angel Navia-Vazquez
Salomon Oldak
Elias Oliveira
Madalina Olteanu
Xavier Parra-Llanas
Jose C. Pereira
Jean-Michel Poggi
Daniel Polani
Fernando Rojas
Enrique Romero
Jean-Pierre Rospars
Fabrice Rossi
Addisson Salazar-Afanador
Miquel Sànchez-Marrè
José Santos
Ricardo Sanz
Alexandre Manhaes
Yván Túpac
Ricardo Tellez
Jarkko Tikka
Claude Touzet
Nicolas Tsapatsoulis
Ignacio Turias
Cristina Urdiales
Julio J. Valdes
Miguel A. Veganzones
Alfredo Vellido
Laurenz Wiskott
Bart Wyns
Hujun Yin
Rodolfo Zunino

Table of Contents

Theoretical Concepts and Neuro Computational Formulations

Generating Random Deviates Consistent with the Long Term Behavior of Stochastic Search Processes in Global Optimization 1
Arturo Berrones

Dynamics of Neural Networks - Some Qualitative Properties 8
Daniela Danciu and Vladimir Răsvan

A Comparative Study of PCA, ICA and Class-Conditional ICA for Naïve Bayes Classifier 16
Liwei Fan and Kim Leng Poh

Effect of Increasing Inhibitory Inputs on Information Processing Within a Small Network of Spiking Neurons 23
Roberta Sirovich, Laura Sacerdote, and Alessandro E.P. Villa

An Efficient VAD Based on a Hang-Over Scheme and a Likelihood Ratio Test 31
O. Pernía, J.M. Górriz, J. Ramírez, C.G. Puntonet, and I. Turias

Analysis of Hebbian Models with Lateral Weight Connections 39
Pedro J. Zufiria and J. Andrés Berzal

Power Quality Event Identification Using Higher-Order Statistics and Neural Classifiers 47
Juan-José González de-la-Rosa, Carlos G. Puntonet, and Antonio Moreno Muñoz

Bio-inspired Memory Generation by Recurrent Neural Networks 55
Manuel G. Bedia, Juan M. Corchado, and Luis F. Castillo

Non-parametric Residual Variance Estimation in Supervised Learning 63
Elia Liitiäinen, Amaury Lendasse, and Francesco Corona

A Study on the Use of Statistical Tests for Experimentation with Neural Networks 72
Julián Luengo, Salvador García, and Francisco Herrera

Improving Models and Learning Procedures

Unified Analysis and Design of ART/SOM Neural Networks and Fuzzy Inference Systems Based on Lattice Theory 80
Vassilis G. Kaburlasos

A Comparison Between ANN Generation and Training Methods and Their Development by Means of Graph Evolution: 2 Sample Problems 94
Daniel Rivero, Julián Dorado, Juan R. Rabuñal, and Marcos Gestal

Robust LTS Backpropagation Learning Algorithm 102
Andrzej Rusiecki

Heuristic Search Based Exploration in Reinforcement Learning 110
Ngo Anh Vien, Nguyen Hoang Viet, SeungGwan Lee, and TaeChoong Chung

Improving Adaptive Boosting with a Relaxed Equation to Update the Sampling Distribution 119
Joaquín Torres-Sospedra, Carlos Hernández-Espinosa, and Mercedes Fernández-Redondo

Automatic Model Selection for Probabilistic PCA 127
Ezequiel López-Rubio, Juan Miguel Ortiz-de-Lazcano-Lobato, Domingo López-Rodríguez, and María del Carmen Vargas-González

Probabilistic Aggregation of Classifiers for Incremental Learning 135
Patricia Trejo, Ricardo Ñanculef, Héctor Allende, and Claudio Moraga

Behaviour-Based Clustering of Neural Networks Applied to Document Enhancement 144
F. Zamora-Martínez, S. España-Boquera, and M.J. Castro-Bleda

Building Automated Negotiation Strategies Enhanced by MLP and GR Neural Networks for Opponent Agent Behaviour Prognosis 152
Ioanna Roussaki, Ioannis Papaioannou, and Miltiades Anangostou

Improving the Performance of the RBF Neural Networks Trained with Imbalanced Samples 162
R. Alejo, V. García, J.M. Sotoca, R.A. Mollineda, and J.S. Sánchez

Surface Modelling with Radial Basis Functions Neural Networks Using Virtual Environments 170
Miguel Ángel López, Héctor Pomares, Miguel Damas, Antonio Díaz-Estrella, Alberto Prieto, Francisco Pelayo, and Eva María de la Plaza Hernández

A New Learning Strategy for Classification Problems with Different Training and Test Distributions 178
Óscar Pérez and Manuel Sánchez-Montañés

Gaussian Fitting Based FDA for Chemometrics 186
Tuomas Kärnä and Amaury Lendasse

Two Pages Graph Layout Via Recurrent Multivalued Neural Networks 194
Domingo López-Rodríguez, Enrique Mérida-Casermeiro, Juan M. Ortíz-de-Lazcano-Lobato, and Gloria Galán-Marín

Self-organizing Networks

Speeding Up the Dissimilarity Self-Organizing Maps by Branch and Bound 203
Brieuc Conan-Guez and Fabrice Rossi

Self-organization of Probabilistic PCA Models 211
Ezequiel López-Rubio, Juan Miguel Ortiz-de-Lazcano-Lobato, Domingo López-Rodríguez, and María del Carmen Vargas-González

A New Adaptation of Self-Organizing Map for Dissimilarity Data 219
Tien Ho-Phuoc and Anne Guérin-Dugué

Fusion of Self Organizing Maps 227
Carolina Saavedra, Rodrigo Salas, Sebastián Moreno, and Héctor Allende

ViSOM Ensembles for Visualization and Classification 235
Bruno Baruque, Emilio Corchado, and Hujun Yin

Adaptive Representation of Objects Topology Deformations with Growing Neural Gas 244
José García-Rodríguez, Francisco Flórez-Revuelta, and Juan Manuel García-Chamizo

Kernel Methods

Kernel Machines for Non-vectorial Data 252
F.J. Ruiz, C. Angulo, N. Agell, and A. Català

An EA Multi-model Selection for SVM Multiclass Schemes 260
G. Lebrun, O. Lezoray, C. Charrier, and H. Cardot

Classifier Complexity Reduction by Support Vector Pruning in Kernel Matrix Learning 268
V. Vijaya Saradhi and Harish Karnick

Multi-classification with Tri-class Support Vector Machines. A Review 276
C. Angulo, L. González, A. Català, and F. Velasco

Tuning L1-SVM Hyperparameters with Modified Radius Margin Bounds and Simulated Annealing 284
Javier Acevedo, Saturnino Maldonado, Philip Siegmann, Sergio Lafuente, and Pedro Gil

Evolutionary and Genetic Algorithms

Well-Distributed Pareto Front by Using the ϵ−*MOGA* Evolutionary Algorithm 292
J.M. Herrero, M. Martínez, J. Sanchis, and X. Blasco

The Parallel Single Front Genetic Algorithm (PSFGA) in Dynamic Multi-objective Optimization 300
Mario Cámara, Julio Ortega, and Francisco de Toro

Exploring Macroevolutionary Algorithms: Some Extensions and Improvements 308
J.A. Becerra, V. Díaz Casás, and R.J. Duro

Optimal Scheduling of Multiple Dam System Using Harmony Search Algorithm 316
Zong Woo Geem

Evolutionary Learning

CoEvRBFN: An Approach to Solving the Classification Problem with a Hybrid Cooperative-Coevolutive Algorithm 324
M. Dolores Pérez-Godoy, Antonio J. Rivera, M. José del Jesus, and Ignacio Rojas

Particle Swarm Optimisation of Multiple Classifier Systems 333
Martin Macaš, Bogdan Gabrys, Dymitr Ruta, and Lenka Lhotská

Parallel Multi-objective Memetic RBFNNs Design and Feature Selection for Function Approximation Problems 341
Alberto Guillén, Héctor Pomares, Jesús González, Ignacio Rojas, L.J. Herrera, and A. Prieto

Hybrid Evolutionary Algorithm with Product-Unit Neural Networks for Classification 351
Francisco J. Martínez Estudillo, César Hervás-Martínez, Alfonso C. Martínez-Estudillo, and Pedro A. Gutiérrez-Peña

Topology Optimization and Training of Recurrent Neural Networks with Pareto-Based Multi-objective Algorithms: A Experimental Study 359
M.P. Cuéllar, M. Delgado, and M.C. Pegalajar

Fuzzy Systems

Multiresolutive Adaptive PN Acquisition Scheme with a Fuzzy Logic Estimator in Non Selective Fast SNR Variation Environments 367
Rosa Maria Alsina Pagès, Clàudia Mateo Segura, and Joan Claudi Socoró Carrié

A Study on the Use of the Fuzzy Reasoning Method Based on the Winning Rule vs. Voting Procedure for Classification with Imbalanced Data Sets 375
Alberto Fernández, Salvador García, María José del Jesús, and Francisco Herrera

Assessing Students' Teamwork Performance by Means of Fuzzy Logic ... 383
José A. Montero, Francesc Alías, Carles Garriga, Lluís Vicent, and Ignasi Iriondo

Networked Control Based on Fuzzy Logic. An Application to a High-Performance Milling Process 391
Rodolfo E. Haber, Michael Schmittdiel, Angel Alique, Andrés Bustillo, and Ramón Galán

Efficient Parametric Adjustment of Fuzzy Inference System Using Unconstrained Optimization 399
Ivan Nunes da Silva and Rogerio Andrade Flauzino

Automatic Selection of Input Variables and Initialization Parameters in an Adaptive Neuro Fuzzy Inference System. Application for Modeling Visual Textures in Digital Images 407
A. Mejías, O. Sánchez, and S. Romero

Neuroingeniering and Hardware Implementations

Neural Inspired Architectures for Nanoelectronics 414
Ralf Eickhoff, Tim Kaulmann, and Ulrich Rückert

Defects Tolerant Logic Gates for Unreliable Future Nanotechnologies ... 422
L. Anghel and M. Nicolaidis

A Programmable Time Event Coded Circuit Block for Reconfigurable Neuromorphic Computing 430
Thomas Jacob Koickal, Luiz C.P. Gouveia, and Alister Hamilton

Integration of Wind Sensors and Analogue VLSI for an Insect-Inspired Robot 438
Y. Zhang, A. Hamilton, R. Cheung, B. Webb, P. Argyrakis, and T. Gonos

IAF Neuron Implementation for Mixed-Signal PCNN Hardware 447
Tim Kaulmann, Sven Lütkemeier, and Ulrich Rückert

Statistical Simulations for Exploring Defect Tolerance and Power Consumption for 4 Subthreshold 1-Bit Addition Circuits 455
Snorre Aunet and Hans Kristian Otnes Berge

Fuzzy ART Neural Network Parallel Computing on the GPU 463
Mario Martínez-Zarzuela, Francisco Javier Díaz Pernas, José Fernando Díez Higuera, and Míriam Antón Rodríguez

Interconnecting VLSI Spiking Neural Networks Using Isochronous Connections 471
Stefan Philipp, Andreas Grübl, Karlheinz Meier, and Johannes Schemmel

A Software Framework for Tuning the Dynamics of Neuromorphic Silicon Towards Biology 479
Daniel Brüderle, Andreas Grübl, Karlheinz Meier, Eilif Mueller, and Johannes Schemmel

What von Neumann Did Not Say About Multiplexing Beyond Gate Failures—The Gory Details 487
Valeriu Beiu, Walid Ibrahim, and Sanja Lazarova-Molnar

Towards a Platform for FPGA Implementation of the MLP Based Back Propagation Algorithm 497
Nouma Izeboudjen, Ahcene Farah, Hamid Bessalah, Ahmed Bouridene, and Nassim Chikhi

Visual Processing Platform Based on Artificial Retinas 506
Sara Granados, Eduardo Ros, Rafael Rodríguez, and Javier Díaz

Data Analysis

Clustering Signals Using Wavelets 514
Michel Misiti, Yves Misiti, Georges Oppenheim, and Jean-Michel Poggi

Information-Theoretic Feature Selection for the Classification of Hysteresis Curves 522
Vanessa Gómez-Verdejo, Michel Verleysen, and Jérôme Fleury

Consumer Profile Identification and Allocation 530
Patrick Letrémy, Marie Cottrell, Eric Esposito, Valérie Laffite, and Sally Showk

Neural Gas Clustering for Dissimilarity Data with Continuous Prototypes 539
Alexander Hasenfuss, Barbara Hammer, Frank-Michael Schleif, and Thomas Villmann

Mixing Kohonen Algorithm, Markov Switching Model and Detection of Multiple Change-Points: An Application to Monetary History 547
Marie-Thérèse Boyer-Xambeu, Ghislain Deleplace, Patrice Gaubert, Lucien Gillard, and Madalina Olteanu

Fuzzy Labeled Self-Organizing Map for Classification of Spectra 556
T. Villmann, F.-M. Schleif, E. Merenyi, and B. Hammer

Some Applications of Interval Analysis to Statistical Problems 564
Vincent Vigneron

Visualizing High-Dimensional Input Data with Growing Self-Organizing Maps 580
Soledad Delgado, Consuelo Gonzalo, Estibaliz Martinez, and Agueda Arquero

Auto Adjustable ANN-Based Classification System for Optimal High Dimensional Data Analysis 588
A. Prieto, F. Bellas, R.J. Duro, and F. Lopez-Peña

Applying Fuzzy Data Mining for Soaring Area Selection 597
A. Salguero, F. Araque, R.A. Carrasco, M.A. Vila, and L. Martínez

Advantages of Using Feature Selection Techniques on Steganalysis Schemes 606
Yoan Miche, Patrick Bas, Amaury Lendasse, Christian Jutten, and Olli Simula

Signal Processing

Genetic Algorithm in the Optimization of the Acoustic Attenuation Systems 614
V. Romero-García, E. Fuster-Garcia, J.V. Sánchez-Pérez, L.M. Garcia-Raffi, X. Blasco, J.M. Herrero, and J. Sanchis

Sine Fitting Multiharmonic Algorithms Implemented by Artificial Neural Networks 622
J.R. Salinas, F. Garcia-Lagos, G. Joya, and F. Sandoval

Low Complexity MLP-Based Radar Detector: Influence of the Training Algorithm and the MLP Size 630
R. Vicen-Bueno, M.P. Jarabo-Amores, D. Mata-Moya, M. Rosa-Zurera, and R. Gil-Pita

Neural Networks for Defect Detection in Non-destructive Evaluation by Sonic Signals 638
Addisson Salazar, Juan M. Unió, Arturo Serrano, and Jorge Gosalbez

Speech Processing

Validation of an Expressive Speech Corpus by Mapping Automatic Classification to Subjective Evaluation 646
Ignasi Iriondo, Santiago Planet, Francesc Alías, Joan-Claudi Socoró, and Elisa Martínez

Extracting User Preferences by GTM for aiGA Weight Tuning in Unit Selection Text-to-Speech Synthesis 654
Lluís Formiga and Francesc Alías

Image Processing

Modeling Visual Perception for Image Processing 662
Jeanny Hérault and Barthélémy Durette

Derivation of SOM-Like Rules for Intensity Inhomogeneity Correction in MRI 676
Maite García-Sebastián, Ana I. Gonzalez, and Manuel Graña

Incidence Position Estimation in a PET Detector Using a Discretized Positioning Circuit and Neural Networks 684
Fernando Mateo, Ramón José Aliaga, Jorge Daniel Martínez, José María Monzó, and Rafael Gadea

Automatic Detection of Filters in Images with Gaussian Noise Using Independent Component Analysis 692
Salua Nassabay, Ingo R. Keck, Carlos G. Puntonet, Rubén M. Clemente, and Elmar W. Lang

Efficient Facial Expression Recognition for Human Robot Interaction ... 700
Fadi Dornaika and Bogdan Raducanu

Face Recognition with Facial Mask Application and Neural Networks ... 709
Marco Grassi and Marcos Faundez-Zanuy

Multi-task Implementation for Image Reconstruction of an AER Communication 717
C. Luján-Martinez, A. Linares-Barranco, A. Jiménez-Fernandez, G. Jiménez-Moreno, and A. Civit-Balcells

Road Sign Recognition Using Spatial Dimension Reduction Methods Based on PCA and SVMs 725
S. Lafuente-Arroyo, A. Sánchez-Fernández, S. Maldonado-Bascón, P. Gil-Jiménez, and F.J. Acevedo-Rodríguez

Specialized Ensemble of Classifiers for Traffic Sign Recognition 733
M.P. Sesmero, J.M. Alonso-Weber, G. Gutiérrez, A. Ledezma, and A. Sanchis

Traffic Sign Classification by Image Preprocessing and Neural Networks 741
R. Vicen-Bueno, A. García-González, E. Torijano-Gordo, R. Gil-Pita, and M. Rosa-Zurera

Time Series and Prediction

A Novel 2-D Model Approach for the Prediction of Hourly Solar Radiation 749
F. Onur Hocaoğlu, Ö. Nezih Gerek, and Mehmet Kurban

Classifying Qualitative Time Series with SOM: The Typology of Career Paths in France 757
Patrick Rousset and Jean-Francois Giret

Continuous Ant Colony Optimization in a SVR Urban Traffic Forecasting Model 765
Wei-Chiang Hong, Ping-Feng Pai, Shun-Lin Yang, and Chien-Yuan Lai

Predicting Financial Distress: A Case Study Using Self-organizing Maps 774
A.M. Mora, J.L.J. Laredo, P.A. Castillo, and J.J. Merelo

Kernel Methods Applied to Time Series Forecasting 782
Ginés Rubio, Héctor Pomares, Luis J. Herrera, and Ignacio Rojas

Robotics and Planning Motor Control

Embodying Cognitive Abilities: Categorization 790
Ricardo A. Téllez and Cecilio Angulo

Behavioral Flexibility: An Emotion Based Approach 798
Carlos Herrera, Alberto Montebelli, and Tom Ziemke

Emerging Behaviors by Learning Joint Coordination in Articulated Mobile Robots 806
Diego E. Pardo Ayala and Cecilio Angulo Bahón

Collaborative Emergent Navigation Based on Biometric Weighted Shared Control 814
B. Fernández-Espejo, A. Poncela, C. Urdiales, and F. Sandoval

Bio-inspired Control Model for Object Manipulation by Humanoid Robots 822
Silvia Tolu, Eduardo Ros, and Rodrigo Agís

Neuronal Architecture for Reactive and Adaptive Navigation of a Mobile Robot 830
Francisco García-Córdova, Antonio Guerrero-González, and Fulgencio Marín-García

Learning Autonomous Behaviours for Non-holonomic Vehicles 839
Tomás Martínez-Marín

Morphological Independence for Landmark Detection in Vision Based SLAM 847
Ivan Villaverde, Manuel Graña, and Alicia d'Anjou

Power System Applications

Self Organizing Map (SOM) Approach for Classification of Mechanical Faults in Induction Motors 855
Emin Germen, D. Gökhan Ece, and Ömer Nezih Gerek

Method for Power System Topology Verification with Use of Radial Basis Function Networks 862
Robert Lukomski and Kazimierz Wilkosz

Intelligent Detection of Voltage Instability in Power Distribution Systems 870
Adnan Khashman, Kadri Buruncuk, and Samir Jabr

RBF Based Induction Motor Control with a Good Nonlinearity Compensation 878
Hasan Rıza Özçalık, Ceyhun Yıldız, Mustafa Danacı, and Zafer Koca

Internet and Web Applications

Neural Networks for QoS Network Management 887
Rafael del-Hoyo-Alonso, Pilar Fernández-de-Alarcón, Juan-José Navamuel-Castillo, Nicolás J. Medrano-Marqués, Bonifacio Martin-del-Brio, Julián Fernández-Navajas, and David Abadía-Gallego

Improvement of Anomaly Intrusion Detection Performance by Indirect Relation for FTP Service 895
ByungRae Cha and JongGeun Jeong

Combining SVM Classifiers for Email Anti-spam Filtering 903
Ángela Blanco, Alba María Ricket, and Manuel Martín-Merino

Analyzing a Web-Based Social Network Using Kohonen's SOM 911
Beatriz Prieto, Juan J. Merelo, Alberto Prieto, and Fernando Tricas

Multiple Instance Learning with Genetic Programming for Web Mining 919
A. Zafra, S. Ventura, E. Herrera-Viedma, and C. Romero

Biomedical Applications

Soft Computing Applications to Prognostics and Health Management (PHM): Leveraging Field Data and Domain Knowledge 928
Piero P. Bonissone and Naresh Iyer

Clustering and Visualizing HIV Quasispecies Using Kohonen's Self-Organizing Maps 940
A.M. Mora, J.J. Merelo, C. Briones, F. Morán, and J.L.J. Laredo

Estimation of the Rate of Detection of Infected Individuals in an Epidemiological Model 948
Miguel Atencia, Gonzalo Joya, Esther García-Garaluz, Hector de Arazoza, and Francisco Sandoval

Use of ANNs as Classifiers for Selective Attention Brain-Computer Interfaces 956
Miguel Ángel López, Héctor Pomares, Miguel Damas, Eduardo Madrid, Alberto Prieto, Francisco Pelayo, and Eva María de la Plaza Hernández

Neural Networks and Other Machine Learning Methods in Cancer Research

Neural Networks and Other Machine Learning Methods in Cancer Research 964
Alfredo Vellido and Paulo J.G. Lisboa

Mixture Modeling of DNA Copy Number Amplification Patterns in Cancer 972
Jarkko Tikka, Jaakko Hollmén, and Samuel Myllykangas

Towards the Integration of a Bioprofile in Ocular Melanoma 980
Azzam Taktak, Antonio Eleuteri, Christian Setzkorn, Angela Douglas, Sarah Coupland, Paul Hiscott, and Bertil Damato

Independent Component Analysis Applied to Detection of Early Breast Cancer Signs 988
Ramón Gallardo-Caballero, Carlos J. García-Orellana, Horacio M. González-Velasco, and Miguel Macías-Macías

A Prototype Integrated Decision Support System for Breast Cancer Oncology 996
Paulo J.G. Lisboa, Ian H. Jarman, Terence A. Etchells, and Phillip Ramsey

Early Breast Cancer Prognosis Prediction and Rule Extraction Using a New Constructive Neural Network Algorithm 1004
Leonardo Franco, José Luis Subirats, Ignacio Molina, Emilio Alba, and José M. Jerez

Genomics and Metabolomics Research for Brain Tumour Diagnosis Based on Machine Learning 1012
Juan M. García–Gómez, Salvador Tortajada, Javier Vicente, Carlos Sáez, Xavier Castells, Jan Luts, Margarida Julià–Sapé, Alfons Juan–Císcar, Sabine Van Huffel, Anna Barceló, Joaquín Ariño, Carles Arús, and Montserrat Robles

Neural Network Based Virtual Reality Spaces for Visual Data Mining of Cancer Data: An Unsupervised Perspective 1020
Enrique Romero, Julio J. Valdés, and Alan J. Barton

Hybrid Unsupervised/Supervised Virtual Reality Spaces for Visualizing Cancer Databases: An Evolutionary Computation Approach 1028
Julio J. Valdés and Alan J. Barton

Supervised Neural Gas for Classification of Functional Data and Its Application to the Analysis of Clinical Proteom Spectra 1036
Frank-Michael Schleif, Thomas Villmann, and Barbara Hammer

Assistive Technologies and e-Health

Intelligent Healthcare Managing: An Assistive Technology Approach 1045
Ulises Cortés, Cristina Urdiales, and Roberta Annicchiarico

Design Improvements for Proportional Control of Autonomous Wheelchairs Via 3DOF Orientation Tracker 1052
Christian Mandel, Udo Frese, and Thomas Röfer

The Impact of Cognitive Navigation Assistance on People with Special Needs 1060
Roberta Annicchiarico, Ulises Cortés, Alessia Federici, Fabio Campana, Cristian Barrué, Antonio B. Martínez, and Carlo Caltagirone

Shared Autonomy in Assistive Technologies 1067
Cristian Barrué, Ulises Cortés, and Roberta Annicchiarico

Augmented Reality Visualization Interface for Biometric Wireless Sensor Networks 1074
Débora Claros, Mario de Haro, Miguel Domínguez, Carmen de Trazegnies, Cristina Urdiales, and Francisco Sandoval

Using CARREL$^+$ to Increase Availability of Human Organs for Transplantation 1082
Pancho Tolchinsky, Ulises Cortés, Sanjay Modgil, Francisco Caballero, and Antonio López-Navidad

Nature-Inspired Planner Agent for Health Care 1090
Javier Bajo, Dante I. Tapia, Sara Rodríguez, Ana de Luis, and Juan M. Corchado

Other Applications

Optical Devices Diagnosis by Neural Classifier Exploiting Invariant Data Representation and Dimensionality Reduction Ability 1098
Matthieu Voiry, Kurosh Madani, Véronique Amarger, and Joël Bernier

A Connectionist Model of Human Reading 1106
J. Ignacio Serrano, Ángel Iglesias, and M. Dolores del Castillo

Discovering Stock Market Trading Rules Using Multi-layer Perceptrons 1114
Piotr Lipinski

Evaluation of Supervised vs. Non Supervised Databases for Hand Geometry Verification 1122
Marcos Faundez-Zanuy, Joan Fabregas, Miguel A. Ferrer, Carlos M. Travieso, and Jesus B. Alonso

Perceptive Particle Swarm Optimization: A New Learning Method from Birds Seeking 1130
Xingjuan Cai, Zhihua Cui, Jianchao Zeng, and Ying Tan

A Comparison of Neural Projection Techniques Applied to Intrusion Detection Systems 1138
Álvaro Herrero, Emilio Corchado, Paolo Gastaldo, and Rodolfo Zunino

Consequences of Data Uncertainty and Data Precision in Artificial Neural Network Sugar Cane Yield Prediction 1147
Héctor F. Satizábal M., Daniel R. Jiménez R., and Andres Pérez-Uribe

Using Simulated Annealing for Optimal Tuning of a PID Controller for Time-Delay Systems. An Application to a High-Performance Drilling Process 1155
Rodolfo E. Haber, Rodolfo Haber-Haber, Raúl M. del Toro, and José R. Alique

Author Index 1163