Preface

This volume is the first part of the two-volume proceedings of the International Conference on Artificial Neural Networks (ICANN 2005), held on September 11–15, 2005 in Warsaw, Poland, with several accompanying workshops held on September 15, 2005 at the Nicolaus Copernicus University, Toruń, Poland.

The ICANN conference is an annual meeting organized by the European Neural Network Society in cooperation with the International Neural Network Society, the Japanese Neural Network Society, and the IEEE Computational Intelligence Society. It is the premier European event covering all topics concerned with neural networks and related areas. The ICANN series of conferences was initiated in 1991 and soon became the major European gathering for experts in those fields.

In 2005 the ICANN conference was organized by the Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland, and the Nicolaus Copernicus University, Toruń, Poland.

From over 600 papers submitted to the regular sessions and some 10 special conference sessions, the International Program Committee selected – after a thorough peer-review process – about 270 papers for publication. The large number of papers accepted is certainly a proof of the vitality and attractiveness of the field of artificial neural networks, but it also shows a strong interest in the ICANN conferences. Because of their reputation as high-level conferences, the ICANN conferences rarely receive papers of a poor quality and thus their rejection rate may be not as high as that of some other conferences. A large number of accepted papers meant that we had to publish the proceedings in two volumes. Papers presented at the post-conference workshops will be published separately.

The first of these volumes, Artificial Neural Networks: Biological Inspirations, is primarily concerned with issues related to models of biological functions, spiking neurons, understanding real brain processes, development of cognitive powers, and inspiration from such models for the development and application of artificial neural networks in information technologies, modeling perception and other biological processes. This volume covers dynamical models of single spiking neurons, their assemblies, population coding, models of neocortex, cerebellum and subcortical brain structures, brain–computer interfaces, and also the development of associative memories, natural language processing and other higher cognitive processes in human beings and other living organisms. Papers on self-organizing maps, evolutionary processes, and cooperative biological behavior, with some applications, are also included. Natural perception, computer vision, recognition and detection of faces and other natural patterns, and sound and speech signal analysis are the topics of many contributions in this volume. Some papers on bioinformatics, bioengineering and biomedical applications are also included in this volume.

The second volume, Artificial Neural Networks: Formal Models and Their Applications, is mainly concerned with new paradigms, architectures and formal models of artificial neural networks that can provide efficient tools and techniques to model
a great array of non-trivial real-world problems. All areas that are of interest to the neural network community are covered, although many computational algorithms discussed in this volume are only remotely inspired by neural networks. A perennial question that the editors and reviewers always face is: how to define the boundary or the limits of a field? What should still be classified as an artificial neural network and what should be left out as a general algorithm that is presented in the network form? There are no clear-cut answers to these questions. Support vector machines and kernel-based methods are well established at neural network conferences although their connections with neural networks are only of a historical interest. Computational learning theory, approximation theory, stochastic optimization and other branches of statistics and mathematics are also of interest to many neural network experts. Thus, instead of asking: Is this still a neural method?, we have rather adopted a policy of accepting all high-quality papers that could be of interest to the neural network community.

A considerable part of the second volume is devoted to learning in its many forms, such as unsupervised and supervised learning, reinforcement learning, Bayesian learning, inductive learning, ensemble learning, and their applications. Many papers are devoted to the important topics in classification and clustering, data fusion from various sources, applications to systems modeling, decision making, optimization, control, prediction and forecasting, speech and text analysis and processing, multimedia systems, applications to various games, and other topics. A section on knowledge extraction from neural networks shows that such models are not always opaque, black boxes. A few papers present also algorithms for fuzzy rule extraction using neural approaches. Descriptions of several hardware implementations of different neural algorithms are also included. Altogether this volume presents a variety of theoretical results and applications covering most areas that the neural network community may be interested in.

We would like to thank, first of all, Ms. Magdalena Gola and Ms. Anna Wilbik for their great contribution in the preparation of the proceedings. Moreover, Ms. Magdalena Gola, Ms. Anna Wilbik, and Ms. Krystyna Warzywoda, with her team, deserve our sincere thanks for their help in the organization of the conference. Finally, we wish to thank Mr. Alfred Hofmann, Ms. Anna Kramer and Ms. Ursula Barth from Springer for their help and collaboration in this demanding publication project.

July 2005

W. Duch, J. Kacprzyk, E. Oja, S. Zadrozny
Table of Contents – Part II

Formal Models and Their Applications

New Neural Network Models

Neuro-fuzzy Kolmogorov’s Network
Yevgeniy Bodyanskiy, Yevgen Gorshkov, Vitaliy Kolodyazhniy,
Valeriya Poyedyntseva .................................................. 1

A Neural Network Model for Inter-problem Adaptive Online Time
Allocation
Matteo Gagliolo, Jürgen Schmidhuber .............................. 7

Discriminant Parallel Perceptrons
Ana González, Iván Cantador, José R. Dorronsoro ............. 13

A Way to Aggregate Multilayer Neural Networks
Maciej Krawczak ............................................................ 19

Generalized Net Models of MLNN Learning Algorithms
Maciej Krawczak ............................................................ 25

Monotonic Multi-layer Perceptron Networks as Universal Approximators
Bernhard Lang ................................................................. 31

Short Term Memories and Forcing the Re-use of Knowledge for
Generalization
Laurent Orseau ................................................................. 39

Interpolation Mechanism of Functional Networks
Yong-Quan Zhou, Li-Cheng Jiao .......................................... 45

Supervised Learning Algorithms

Neural Network Topology Optimization
Mohammed Attik, Laurent Bougrain, Frédéric Alexandre .......... 53

Rough Sets-Based Recursive Learning Algorithm for Radial Basis
Function Networks
Yevgeniy Bodyanskiy, Yevgen Gorshkov, Vitaliy Kolodyazhniy,
Irina Pliss ................................................................. 59
Support Vector Neural Training
   Włodzisław Duch ........................................ 67

Evolutionary Algorithms for Real-Time Artificial Neural Network Training
   Ananda Jagadeesan, Grant Maxwell, Christopher MacLeod .............. 73

Developing Measurement Selection Strategy for Neural Network Models
   Przemysław Prętka, Marcin Witczak ........................................ 79

Nonlinear Regression with Piecewise Affine Models Based on RBFN
   Masaru Sakamoto, Dong Duo, Yoshihiro Hashimoto, Toshiaki Itoh ... 85

Batch-Sequential Algorithm for Neural Networks Trained with Entropic Criteria
   Jorge M. Santos, Joaquim Marques de Sá, Luís A. Alexandre .......... 91

Multiresponse Sparse Regression with Application to Multidimensional Scaling
   Timo Similä, Jarkko Tikka .............................................. 97

Training Neural Networks Using Taguchi Methods: Overcoming Interaction Problems
   Alagappan Viswanathan, Christopher MacLeod, Grant Maxwell,
   Sashank Kalidindi ...................................................... 103

A Global-Local Artificial Neural Network with Application to Wave Overtopping Prediction
   David Wedge, David Ingram, David McLean, Clive Mingham,
   Zuhair Bandar .......................................................... 109

Ensemble-Based Learning

Learning with Ensemble of Linear Perceptrons
   Pitoyo Hartono, Shuji Hashimoto ....................................... 115

Combination Methods for Ensembles of RBFs
   Carlos Hernández-Espinosa, Joaquín Torres-Sospedra,
   Mercedes Fernández-Redondo ........................................... 121

Ensemble Techniques for Credibility Estimation of GAME Models
   Pavel Kordík, Miroslav Šnorek ........................................... 127
Combination Methods for Ensembles of MF  
Joaquín Torres-Sospedra, Mercedes Fernández-Redondo,  
Carlos Hernández-Espinosa ........................................... 133

New Results on Ensembles of Multilayer Feedforward  
Joaquín Torres-Sospedra, Carlos Hernández-Espinosa,  
Mercedes Fernández-Redondo ........................................... 139

Unsupervised Learning

On Variations of Power Iteration  
Seungjin Choi ............................................................... 145

Linear Dimension Reduction Based on the Fourth-Order Cumulant  
 Tensor  
M. Kawanabe ............................................................... 151

On Spectral Basis Selection for Single Channel Polyphonic Music  
Separation  
Minje Kim, Seungjin Choi .................................................... 157

Independent Subspace Analysis Using k-Nearest Neighborhood  
Distances  
Barnabás Póczos, András Lőrincz ........................................ 163

Recurrent Neural Networks

Study of the Behavior of a New Boosting Algorithm for Recurrent  
Neural Networks  
Mohammad Assaad, Romuald Boné, Hubert Cardot .................. 169

Time Delay Learning by Gradient Descent in Recurrent Neural Networks  
Romuald Boné, Hubert Cardot ............................................. 175

Representation and Identification Method of Finite State Automata by  
Recurrent High-Order Neural Networks  
Yasuaki Kuroe .............................................................. 181

Global Stability Conditions of Locally Recurrent Neural Networks  
Krzysztof Patan, Józef Korbicz, Przemysław Prętki .................. 191

Reinforcement Learning

An Agent-Based PLA for the Cascade Correlation Learning Architecture  
Ireneusz Czarnowski, Piotr Jędrzejowicz ................................. 197
Dual Memory Model for Using Pre-existing Knowledge in Reinforcement Learning Tasks
   Kary Främling .............................................. 203

Stochastic Processes for Return Maximization in Reinforcement Learning
   Kazunori Iwata, Hideaki Sakai, Kazushi Ikeda ...................... 209

Maximizing the Ratio of Information to Its Cost in Information Theoretic Competitive Learning
   Ryotaro Kamimura, Sachiko Aida-Hyugaji .......................... 215

Completely Self-referential Optimal Reinforcement Learners
   Jürgen Schmidhuber ......................................... 223

Model Selection Under Covariate Shift
   Masashi Sugiyama, Klaus-Robert Müller .............................. 235

Bayesian Approaches to Learning

Smooth Performance Landscapes of the Variational Bayesian Approach
   Zhuo Gao, K.Y. Michael Wong ..................................... 241

Jacobi Alternative to Bayesian Evidence Maximization in Diffusion Filtering
   Ramūnas Girdziušas, Jorma Laaksonen ............................... 247

Bayesian Learning of Neural Networks Adapted to Changes of Prior Probabilities
   Yoshifusa Ito, Cidambi Srinivasan, Hiroyuki Izumi .................. 253

A New Method of Learning Bayesian Networks Structures from Incomplete Data
   Xiaolin Li, Xiangdong He, Senmiao Yuan ............................ 261

Bayesian Hierarchical Ordinal Regression
   Ulrich Paquet, Sean Holden, Andrew Naish-Guzman ................. 267

Traffic Flow Forecasting Using a Spatio-temporal Bayesian Network Predictor
   Shiliang Sun, Changshui Zhang, Yi Zhang ........................... 273
Learning Theory

Manifold Constrained Variational Mixtures
   Cédric Archambeau, Michel Verleysen ......................... 279

Handwritten Digit Recognition with Nonlinear Fisher Discriminant Analysis
   Pietro Berkes .................................................. 285

Separable Data Aggregation in Hierarchical Networks of Formal Neurons
   Leon Bobrowski ............................................... 289

Induced Weights Artificial Neural Network
   Slawomir Golak ............................................... 295

SoftDoubleMinOver: A Simple Procedure for Maximum Margin Classification
   Thomas Martinetz, Kai Labusch, Daniel Schneegaß .......... 301

On the Explicit Use of Example Weights in the Construction of Classifiers
   Andrew Naish-Guzman, Sean Holden, Ulrich Paquet ........ 307

A First Approach to Solve Classification Problems Based on Functional Networks
   Rosa Eva Pruneda, Beatriz Lacruz, Cristina Solares .......... 313

A Description of a Simulation Environment and Neural Architecture for A-Life
   Leszek Rybicki ............................................... 319

Neural Network Classifiers in Arrears Management
   Esther Scheurmann, Chris Matthews ......................... 325

Sequential Classification of Probabilistic Independent Feature Vectors Based on Multilayer Perceptron
   Tomasz Walkowiak ............................................. 331

Multi-class Pattern Classification Based on a Probabilistic Model of Combining Binary Classifiers
   Naoto Yukinawa, Shigeyuki Oba, Kikuya Kato, Shin Ishii .... 337

Evaluating Performance of Random Subspace Classifier on ELENA Classification Database
   Dmitry Zhora .................................................. 343
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial Neural Networks for System Modeling, Decision Making, Optimalization and Control</td>
<td>A New RBF Neural Network Based Non-linear Self-tuning Pole-Zero Placement Controller</td>
<td>351</td>
</tr>
<tr>
<td></td>
<td>Rudwan Abdullah, Amir Hussain, Ali Zayed</td>
<td></td>
</tr>
<tr>
<td>Using the Levenberg-Marquardt for On-line Training of a Variant System</td>
<td>Fernando Morgado Dias, Ana Antunes, José Vieira, Alexandre Manuel Mota</td>
<td>359</td>
</tr>
<tr>
<td>Optimal Control Yields Power Law Behavior</td>
<td>Christian W. Eurich, Klaus Pawelzik</td>
<td>365</td>
</tr>
<tr>
<td>A NeuroFuzzy Controller for 3D Virtual Centered Navigation in Medical Images of Tubular Structures</td>
<td>Luca Ferrarini, Hans Olofsen, Johan H.C. Reiber, Faiza Admiraal-Behloul</td>
<td>371</td>
</tr>
<tr>
<td>Emulating Process Simulators with Learning Systems</td>
<td>Daniel Gillblad, Anders Holst, Björn Levin</td>
<td>377</td>
</tr>
<tr>
<td>Evolving Modular Fast-Weight Networks for Control</td>
<td>Faustino Gomez, Jürgen Schmidhuber</td>
<td>383</td>
</tr>
<tr>
<td>Topological Derivative and Training Neural Networks for Inverse Problems</td>
<td>Lidia Jackowska-Strumiño, Jan Sokolowski, Antoni Żochowski</td>
<td>391</td>
</tr>
<tr>
<td>Application of Domain Neural Network to Optimization Tasks</td>
<td>Boris Kryzhanovsky, Bashir Magomedov</td>
<td>397</td>
</tr>
<tr>
<td>Eigenvalue Problem Approach to Discrete Minimization</td>
<td>Leonid B. Litinskii</td>
<td>405</td>
</tr>
<tr>
<td>A Neurocomputational Approach to Decision Making and Aging</td>
<td>Rui Mata</td>
<td>411</td>
</tr>
<tr>
<td>Comparison of Neural Network Robot Models with Not Inverted and Inverted Inertia Matrix</td>
<td>Jakub Możaryn, Jerzy E. Kurek</td>
<td>417</td>
</tr>
<tr>
<td>Causal Neural Control of a Latching Ocean Wave Point Absorber</td>
<td>T.R. Mundon, A.F. Murray, J. Hallam, L.N. Patel</td>
<td>423</td>
</tr>
</tbody>
</table>
## Table of Contents – Part II

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Off-Policy Natural Policy Gradient Method for a Partial Observable Markov Decision Process</td>
<td>Yutaka Nakamura, Takeshi Mori, Shin Ishii</td>
<td>431</td>
</tr>
<tr>
<td>A Simplified Forward-Propagation Learning Rule Applied to Adaptive Closed-Loop Control</td>
<td>Yoshihiro Ohama, Naohiro Fukumura, Yoji Uno</td>
<td>437</td>
</tr>
<tr>
<td>Improved, Simpler Neural Controllers for Lamprey Swimming</td>
<td>Leena N. Patel, John Hallam, Alan Murray</td>
<td>445</td>
</tr>
<tr>
<td>Supervision of Control Valves in Flotation Circuits Based on Artificial Neural Network</td>
<td>D. Sbarbaro, G. Carvajal</td>
<td>451</td>
</tr>
<tr>
<td>Comparison of Volterra Models Extracted from a Neural Network for Nonlinear Systems Modeling</td>
<td>Georgina Stegmayer</td>
<td>457</td>
</tr>
<tr>
<td>Identification of Frequency-Domain Volterra Model Using Neural Networks</td>
<td>Georgina Stegmayer, Omar Chiotti</td>
<td>465</td>
</tr>
<tr>
<td>Hierarchical Clustering for Efficient Memory Allocation in CMAC Neural Network</td>
<td>Sintiani D. Teddy, Edmund M.-K. Lai</td>
<td>473</td>
</tr>
</tbody>
</table>

### Special Session: Knowledge Extraction from Neural Networks

**Organizer and Chair: D. A. Elizondo**

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Extraction from Unsupervised Multi-topographic Neural Network Models</td>
<td>Shadi Al Shehabi, Jean-Charles Lamirel</td>
<td>479</td>
</tr>
<tr>
<td>Current Trends on Knowledge Extraction and Neural Networks</td>
<td>David A. Elizondo, Mario A. Góngora</td>
<td>485</td>
</tr>
<tr>
<td>Prediction of Yeast Protein–Protein Interactions by Neural Feature Association Rule</td>
<td>Jae-Hong Eom, Byoung-Tak Zhang</td>
<td>491</td>
</tr>
<tr>
<td>A Novel Method for Extracting Knowledge from Neural Networks with Evolving SQL Queries</td>
<td>Mario A. Góngora, Tim Watson, David A. Elizondo</td>
<td>497</td>
</tr>
</tbody>
</table>
CrySSMEx, a Novel Rule Extractor for Recurrent Neural Networks: Overview and Case Study
Henrik Jacobsson, Tom Ziemke .................................................. 503

Computational Neurogenetic Modeling: Integration of Spiking Neural Networks, Gene Networks, and Signal Processing Techniques
Nikola Kasabov, Lubica Benuskova, Simei Gomes Wysoski ............. 509

Information Visualization for Knowledge Extraction in Neural Networks
Liz Stuart, Davide Marocco, Angelo Cangelosi ............................ 515

Combining GAs and RBF Neural Networks for Fuzzy Rule Extraction from Numerical Data
Manolis Wallace, Nicolas Tsapatsoulis ....................................... 521

Temporal Data Analysis, Prediction and Forecasting

Neural Network Algorithm for Events Forecasting and Its Application to Space Physics Data
S.A. Dolenko, Yu.V. Orlov, I.G. Persiantsev, Ju.S. Shugai ............. 527

Counterpropagation with Delays with Applications in Time Series Prediction
Carmen Fierascu ................................................................. 533

Bispectrum-Based Statistical Tests for VAD
J.M. Górriz, J. Ramírez, C.G. Puntonet, F. Theis, E.W. Lang ...... 541

Back-Propagation as Reinforcement in Prediction Tasks
André Grüning ................................................................. 547

Mutual Information and $k$-Nearest Neighbors Approximator for Time Series Prediction
Antti Sorjamaa, Jin Hao, Amaury Lendasse .............................. 553

Some Issues About the Generalization of Neural Networks for Time Series Prediction
Wen Wang, Pieter H.A.J.M. Van Gelder, J.K. Vrijling .............. 559

Multi-step-ahead Prediction Based on B-Spline Interpolation and Adaptive Time-Delay Neural Network
Jing-Xin Xie, Chun-Tian Cheng, Bin Yu, Qing-Rui Zhang .......... 565
Support Vector Machines and Kernel-Based Methods

Training of Support Vector Machines with Mahalanobis Kernels

Shigeo Abe .................................................... 571

Smooth Bayesian Kernel Machines

Rutger W. ter Borg, Léon J.M. Rothkrantz .................... 577

A New Kernel-Based Algorithm for Online Clustering

Habiboulaye Amadou Boubacar, Stéphane Lecoeuche .......... 583

The LCCP for Optimizing Kernel Parameters for SVM

Sabri Boughorbel, Jean-Philippe Tarel, Nozha Boujemaa .... 589

The GCS Kernel for SVM-Based Image Recognition

Sabri Boughorbel, Jean-Philippe Tarel, François Fleuret,
Nozha Boujemaa .............................................. 595

Informational Energy Kernel for LVQ

Angel Catáron, Răzvan Andonie .............................. 601

Reducing the Effect of Out-Voting Problem in Ensemble Based
Incremental Support Vector Machines

Zeki Erdem, Robi Polikar, Fikret Gurnen, Nejat Yumusak .... 607

A Comparison of Different Initialization Strategies to Reduce the
Training Time of Support Vector Machines

Ariel García-Gamboa, Neil Hernández-Gress,
Miguel González-Mendoza, Rodolfo Ibarra-Orozco,
Jaime Mora-Vargas ............................................ 613

A Hierarchical Support Vector Machine Based Solution for Off-line
Inverse Modeling in Intelligent Robotics Applications

D.A. Karras ......................................................... 619

LS-SVM Hyperparameter Selection with a Nonparametric Noise
Estimator

Amaury Lendasse, Yongnan Ji, Nima Reyhani, Michel Verleysen .. 625

Building Smooth Neighbourhood Kernels via Functional Data Analysis

Alberto Muñoz, Javier M. Moguerza .......................... 631

Recognition of Heartbeats Using Support Vector Machine
Networks – A Comparative Study

Stanisław Osowski, Tran Haoi Linh, Tomasz Markiewicz ........ 637
Componentwise Support Vector Machines for Structure Detection
   K. Pelckmans, J.A.K. Suykens, B. De Moor ....................... 643

Memory in Backpropagation-Decorrelation O(N) Efficient Online
Recurrent Learning
   Jochen J. Steil ................................................ 649

Soft Computing Methods for Data Representation,
Analysis and Processing

Incremental Rule Pruning for Fuzzy ARTMAP Neural Network
   A. Andrés-Andrés, E. Gómez-Sánchez, M.L. Bote-Lorenzo .......... 655

An Inductive Learning Algorithm with a Partial Completeness and
Consistence via a Modified Set Covering Problem
   Janusz Kacprzyk, Grażyna Szkatuła ............................ 661

A Neural Network for Text Representation
   Mikaela Keller, Samy Bengio .................................... 667

A Fuzzy Approach to Some Set Approximation Operations
   Anna Maria Radzikowska ........................................... 673

Connectionist Modeling of Linguistic Quantifiers
   Rohana K. Rajapakse, Angelo Cangelosi, Kenny R. Coventry,
   Steve Newstead, Alison Bacon ................................... 679

Fuzzy Rule Extraction Using Recombined RecBF for Very-Imbalanced
Datasets
   Vicenç Soler, Jordi Roig, Marta Prim ............................ 685

An Iterative Artificial Neural Network for High Dimensional Data
Analysis
   Armando Vieira .................................................... 691

Towards Human Friendly Data Mining: Linguistic Data Summaries
and Their Protoforms
   Sławomir Zadrożny, Janusz Kacprzyk, Magdalena Gola ............ 697

Special Session: Data Fusion for Industrial, Medical
and Environmental Applications
Organizers and Chairs: D. Mandic, D. Obradovic

Localization of Abnormal EEG Sources Incorporating Constrained BSS
   Mohamed Amin Latif, Saeid Sanei, Jonathon A. Chambers ........... 703
Myocardial Blood Flow Quantification in Dynamic PET: An Ensemble ICA Approach
  Byeong Il Lee, Jae Sung Lee, Dong Soo Lee, Seungjin Choi ............... 709

Data Fusion for Modern Engineering Applications: An Overview
  Danilo P. Mandic, Dragan Obradovic, Anthony Kuh, Tülay Adali,
  Udo Trutschel, Martin Golz, Philippe De Wilde, Javier Barria,
  Anthony Constantinides, Jonathon Chambers ......................... 715

Modified Cost Functions for Modelling Air Quality Time Series by Using Neural Networks
  Giuseppe Nunnari, Flavio Cannavó ................................ 723

Troubleshooting in GSM Mobile Telecommunication Networks Based on Domain Model and Sensory Information
  Dragan Obradovic, Ruxandra Lupas Scheiterer ....................... 729

Energy of Brain Potentials Evoked During Visual Stimulus: A New Biometric?
  Ramaswamy Palaniappan, Danilo P. Mandic ......................... 735

Communicative Interactivity – A Multimodal Communicative Situation Classification Approach
  Tomasz M. Rutkowski, Danilo Mandic ............................... 741

Bayesian Network Modeling Aspects Resulting from Applications in Medical Diagnostics and GSM Troubleshooting
  Ruxandra Lupas Scheiterer, Dragan Obradovic ................... 747

Fusion of State Space and Frequency-Domain Features for Improved Microsleep Detection
  David Sommer, Mo Chen, Martin Golz, Udo Trutschel,
  Danilo Mandic ....................................................... 753

Combining Measurement Quality into Monitoring Trends in Foliar Nutrient Concentrations
  Mika Sulkava, Pasi Rautio, Jaakko Hollmén ........................ 761

A Fast and Efficient Method for Compressing fMRI Data Sets
  Fabian J. Theis, Toshihisa Tanaka .................................. 769
### Special Session: Non-linear Predictive Models for Speech Processing

Organizers and Chairs: M. Chetouani, M. Faundez-Zanuy, B. Gas, A. Hussain

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictive Speech Coding Improvements Based on Speaker Recognition Strategies</td>
<td>Marcos Faundez-Zanuy</td>
<td>785</td>
</tr>
<tr>
<td>Predictive Kohonen Map for Speech Features Extraction</td>
<td>Bruno Gas, Mohamed Chetouani, Jean-Luc Zarader, Christophe Charbuillet</td>
<td>793</td>
</tr>
<tr>
<td>Bidirectional LSTM Networks for Improved Phoneme Classification and Recognition</td>
<td>Alex Graves, Santiago Fernández, Jürgen Schmidhuber</td>
<td>799</td>
</tr>
<tr>
<td>Improvement in Language Detection by Neural Discrimination in Comparison with Predictive Models</td>
<td>Sébastien Herry</td>
<td>805</td>
</tr>
</tbody>
</table>

### Special Session: Intelligent Multimedia and Semantics

Organizers and Chairs: Y. Avrithis, S. Kollias

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Ontology Alignments Using Recursive Neural Networks</td>
<td>Alexandros Chortaras, Giorgos Stamou, Andreas Stafylopatis</td>
<td>811</td>
</tr>
<tr>
<td>Minimizing Uncertainty in Semantic Identification When Computing Resources Are Limited</td>
<td>Manolis Falelakis, Christos Diou, Manolis Wallace, Anastasios Delopoulos</td>
<td>817</td>
</tr>
<tr>
<td>Automated Extraction of Object- and Event-Metadata from Gesture Video Using a Bayesian Network</td>
<td>Dimitrios I. Kosmopoulos</td>
<td>823</td>
</tr>
<tr>
<td>f-SWRL: A Fuzzy Extension of SWRL</td>
<td>Jeff Z. Pan, Giorgos Stamou, Vassilis Tzouvaras, Ian Horrocks</td>
<td>829</td>
</tr>
</tbody>
</table>
An Analytic Distance Metric for Gaussian Mixture Models with Application in Image Retrieval  
G. Sfikas, C. Constantinopoulos, A. Likas, N.P. Galatsanos ........... 835

Content-Based Retrieval of Web Pages and Other Hierarchical Objects with Self-organizing Maps  
Mats Sjöberg, Jorma Laaksonen ............................................. 841

Fusing MPEG-7 Visual Descriptors for Image Classification  
Evaggelos Spyrou, Hervé Le Borgne, Theofilos Mailis, Eddie Cooke, Yannis Avrithis, Noel O’Connor ....................... 847

Applications to Natural Language Processing

The Method of Inflection Errors Correction in Texts Composed in Polish Language – A Concept  
Tomasz Kapłon, Jacek Mazurkiewicz ........................................... 853

Coexistence of Fuzzy and Crisp Concepts in Document Maps  
Mieczysław A. Kłopotek, Sławomir T. Wierzchoń, Krzysztof Ciesielski, Michał Dramiński, Dariusz Czerski .............. 859

Information Retrieval Based on a Neural-Network System with Multi-stable Neurons  
Yukihiro Tsuboshita, Hiroshi Okamoto ...................................... 865

Neural Coding Model of Associative Ontology with Up/Down State and Morphoelectrotonic Transform  
Norifumi Watanabe, Shun Ishizaki ........................................... 873

Various Applications

Robust Structural Modeling and Outlier Detection with GMDH-Type Polynomial Neural Networks  
Tatyana Aksenova, Vladimir Volkovich, Alessandro E.P. Villa ...... 881

A New Probabilistic Neural Network for Fault Detection in MEMS  
Reza Asgary, Karim Mohammadi .............................................. 887

Analog Fault Detection Using a Neuro Fuzzy Pattern Recognition Method  
Reza Asgary, Karim Mohammadi .............................................. 893
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Vector Machine for Recognition of Bio-products in Gasoline</td>
<td>Kazimierz Brudzewski, Stanisław Osowski, Tomasz Markiewicz, Jan Ulaczyk</td>
<td>899</td>
</tr>
<tr>
<td>detecting compounded anomalous snmp situations using cooperative unsupervised pattern recognition</td>
<td>Emilio Corchado, Álvaro Herrero, José Manuel Sáiz</td>
<td>905</td>
</tr>
<tr>
<td>using multilayer perceptrons to align high range resolution radar signals</td>
<td>R. Gil-Pita, M. Rosa-Zurera, P. Jarabo-Amores, F. López-Ferreras</td>
<td>911</td>
</tr>
<tr>
<td>approximating the neyman-pearson detector for swerling i targets with low complexity neural networks</td>
<td>D. de la Mata-Moya, P. Jarabo-Amores, M. Rosa-Zurera, F. López-Ferreras, R. Vicen-Bueno</td>
<td>917</td>
</tr>
<tr>
<td>completing hedge fund missing net asset values using kohonen maps and constrained randomization</td>
<td>Paul Merlin, Bertrand Maillet</td>
<td>923</td>
</tr>
<tr>
<td>neural architecture for concurrent map building and localization using adaptive appearance maps</td>
<td>S. Mueller, A. Koenig, H.-M. Gross</td>
<td>929</td>
</tr>
<tr>
<td>new neural network based mobile location estimation in a metropolitan area</td>
<td>Javed Muhammad, Amir Hussain, Alexander Neskovic, Evan Magill</td>
<td>935</td>
</tr>
<tr>
<td>lagrange neural network for solving csp which includes linear inequality constraints</td>
<td>Takahiro Nakano, Masahiro Nagamatu</td>
<td>943</td>
</tr>
<tr>
<td>modelling engineering problems using dimensional analysis for feature extraction</td>
<td>Noelia Sánchez-Maroño, Oscar Fontenla-Romero, Enrique Castillo, Amparo Alonso-Betanzos</td>
<td>949</td>
</tr>
<tr>
<td>research on electrotactile representation technology based on spatiotemporal dual-channel</td>
<td>Liguo Shuai, Yinghui Kuang, Xuemei Wang, Yanfang Xu</td>
<td>955</td>
</tr>
<tr>
<td>application of bayesian mlp techniques to predicting mineralization potential from geoscientific data</td>
<td>Andrew Skabar</td>
<td>963</td>
</tr>
</tbody>
</table>
Solving Satisfiability Problem by Parallel Execution of Neural Networks with Biases  
*Kairong Zhang, Masahiro Nagamatu* ........................................... 969

**Special Session: Computational Intelligence in Games**  
**Organizer and Chair: J. Mańdziuk**

Local vs Global Models in Pong  
*Colin Fyfe* ................................................................. 975

Evolution of Heuristics for Give-Away Checkers  
*Magdalena Kusiak, Karol Walędzik, Jacek Mańdziuk* ............... 981

Nonlinear Relational Markov Networks with an Application to the Game of Go  
*Tapani Raiko* ............................................................... 989

Flexible Decision Process for Astronauts in Marsbase Simulator  
*Jean Marc Salotti* .......................................................... 997

**Issues in Hardware Implementation**

Tolerance of Radial Basis Functions Against Stuck-At-Faults  
*Ralf Eickhoff, Ulrich Rückert* ........................................ 1003

The Role of Membrane Threshold and Rate in STDP Silicon Neuron Circuit Simulation  
*Juan Huo, Alan Murray* ................................................ 1009

Systolic Realization of Kohonen Neural Network  
*Jacek Mazurkiewicz* ....................................................... 1015

A Real-Time, FPGA Based, Biologically Plausible Neural Network Processor  
*Martin Pearson, Ian Gilhespy, Kevin Gurney, Chris Melhuish, Benjamin Mitchinson, Mokhtar Nibouche, Anthony Pipe* ............ 1021

Balancing Guidance Range and Strength Optimizes Self-organization by Silicon Growth Cones  
*Brian Taba, Kwabena Boahen* ........................................... 1027

**Acknowledgements to the Reviewers** ............................... 1035

**Author Index** ............................................................. 1039
## Table of Contents – Part I
### Biological Inspirations

#### Modeling the Brain and Cognitive Functions

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty Analysis in Dynamic Scene for Autonomous Mental Development</td>
<td>Sang-Woo Ban, Minho Lee</td>
<td>1</td>
</tr>
<tr>
<td>The Computational Model to Simulate the Progress of Perceiving Patterns in Neuron Population</td>
<td>Wen-Chuang Chou, Tsung-Ying Sun</td>
<td>7</td>
</tr>
<tr>
<td>Short Term Memory and Pattern Matching with Simple Echo State Networks</td>
<td>Georg Fette, Julian Eggert</td>
<td>13</td>
</tr>
<tr>
<td>Analytical Solution for Dynamic of Neuronal Populations</td>
<td>Wentao Huang, Licheng Jiao, Shiping Ma, Yuelei Xu</td>
<td>19</td>
</tr>
<tr>
<td>Dynamics of Cortical Columns – Sensitive Decision Making</td>
<td>Jörg Lücke</td>
<td>25</td>
</tr>
<tr>
<td>Dynamics of Cortical Columns – Self-organization of Receptive Fields</td>
<td>Jörg Lücke, Jan D. Bouecke</td>
<td>31</td>
</tr>
<tr>
<td>Optimal Information Transmission Through Cortico-Cortical Synapses</td>
<td>Marcelo A. Montemurro, Stefano Panzeri</td>
<td>39</td>
</tr>
<tr>
<td>Ensemble of SVMs for Improving Brain Computer Interface P300 Speller Performances</td>
<td>A. Rakotomamonjy, V. Guigue, G. Mallet, V. Alvarado</td>
<td>45</td>
</tr>
<tr>
<td>Modelling Path Integrator Recalibration Using Hippocampal Place Cells</td>
<td>T. Strösslin, R. Chavarriaga, D. Sheynikhovich, W. Gerstner</td>
<td>51</td>
</tr>
<tr>
<td>Coding of Objects in Low-Level Visual Cortical Areas</td>
<td>N.R. Taylor, M. Hartley, J.G. Taylor</td>
<td>57</td>
</tr>
<tr>
<td>A Gradient Rule for the Plasticity of a Neuron’s Intrinsic Excitability</td>
<td>Jochen Triesch</td>
<td>65</td>
</tr>
</tbody>
</table>
Building the Cerebellum in a Computer
Tadashi Yamazaki, Shigeru Tanaka ........................................... 71

Special Session: The Development of Cognitive Powers in Embodied Systems

Combining Attention and Value Maps
Stathis Kasderidis, John G. Taylor ........................................... 79

Neural Network with Memory and Cognitive Functions
Janusz A. Starzyk, Yue Li, David D. Vogel ................................. 85

Associative Learning in Hierarchical Self Organizing Learning Arrays
Janusz A. Starzyk, Zhen Zhu, Yue Li ....................................... 91

A Review of Cognitive Processing in the Brain
John G. Taylor ............................................................................. 97

Spiking Neural Networks

Neuronal Behavior with Sub-threshold Oscillations and Spiking/Bursting Activity Using a Piecewise Linear Two-Dimensional Map
Carlos Aguirre, Doris Campos, Pedro Pascual,
Eduardo Serrano ........................................................................ 103

On-Line Real-Time Oriented Application for Neuronal Spike Sorting with Unsupervised Learning
Yoshiyuki Asai, Tetyana I. Aksenova, Alessandro E.P. Villa .......... 109

A Spiking Neural Sparse Distributed Memory Implementation for Learning and Predicting Temporal Sequences
J. Bose, S.B. Furber, J.L. Shapiro ................................................ 115

ANN-Based System for Sorting Spike Waveforms Employing Refractory Periods
Thomas Hermle, Martin Bogdan, Cornelius Schwarz,
Wolfgang Rosenstiel ................................................................. 121

Emergence of Oriented Cell Assemblies Associated with Spike-Timing-Dependent Plasticity
Javier Iglesias, Jan Eriksson, Beatriz Pardo, Marco Tomassini,
Alessandro E.P. Villa ................................................................. 127
An Information Geometrical Analysis of Neural Spike Sequences
Kazushi Ikeda .................................................. 133

Perceptual Binding by Coupled Oscillatory Neural Network
Teijiro Isokawa, Haruhiko Nishimura, Naotake Kamiura,
Nobuyuki Matsui............................................ 139

Experimental Demonstration of Learning Properties of a
New Supervised Learning Method for the Spiking Neural
Networks
Andrzej Kasinski, Filip Ponulak .............................. 145

Single-Unit Recordings Revisited: Activity in Recurrent
Microcircuits
Raul C. Mureșan, Gordon Pipa, Diek W. Wheeler ......... 153

A Hardware/Software Framework for Real-Time Spiking Systems
Matthias Oster, Adrian M. Whatley, Shih-Chii Liu,
Rodney J. Douglas .............................................. 161

Efficient Source Detection Using Integrate-and-Fire Neurons
Laurent Perrinet ................................................. 167

**Associative Memory Models**

A Model for Hierarchical Associative Memories via Dynamically
Coupled GBSB Neural Networks
Rogério M. Gomes, Antônio P. Braga, Henrique E. Borges .... 173

Balance Algorithm for Point-Feature Label Placement Problem
Zheng He, Koichi Harada ........................................ 179

Models of Self-correlation Type Complex-Valued Associative Memories
and Their Dynamics
Yasuaki Kuroe, Yuriko Taniguchi ............................. 185

Recovery of Performance in a Partially Connected Associative Memory
Network Through Coding
Kit Longden ...................................................... 193

Optimal Triangle Stripifications as Minimum Energy States in
Hopfield Nets
Jiří Šíma ......................................................... 199
# Models of Biological Functions

A Biophysical Model of Decision Making in an Antisaccade Task Through Variable Climbing Activity
*Vassilis Cutsuridis, Ioannis Kahramanoglou, Stavros Perantonis, Ioannis Evdokimidis, Nikolaos Smyrnis* ................................................. 205

Can Dynamic Neural Filters Produce Pseudo-Random Sequences?
*Yishai M. Elyada, David Horn* .......................................................... 211

Making Competition in Neural Fields Suitable for Computational Architectures
*Hervé Frezza-Buet, Olivier Ménard* .................................................... 217

Neural Network Computations with Negative Triggering Thresholds
*Petro Gopych* .................................................................................. 223

A Model for Delay Activity Without Recurrent Excitation
*Marc de Kamps* .............................................................................. 229

Neuronal Coding Strategies for Two-Alternative Forced Choice Tasks
*Erich L. Schulzke, Christian W. Eurich* .............................................. 235

Learning Features of Intermediate Complexity for the Recognition of Biological Motion
*Rodrigo Sigala, Thomas Serre, Tomaso Poggio, Martin Giese* .......... 241

Study of Nitric Oxide Effect in the Hebbian Learning: Towards a Diffusive Hebb’s Law
*C.P. Suárez Araujo, P. Fernández López, P. García Báez, J. Regidor García* ...................................................................................... 247

### Special Session: Projects in the Area of NeuroIT

Deterministic Modelling of Randomness with Recurrent Artificial Neural Networks
*Norman U. Baier, Oscar De Feo* ......................................................... 255

Action Understanding and Imitation Learning in a Robot-Human Task
*Wolfram Erlhagen, Albert Mukovskiy, Estela Bicho, Giorgio Panin, Csaba Kiss, Alois Knoll, Hein van Schie, Harold Bekkering* ........ 261
Comparative Investigation into Classical and Spiking Neuron Implementations on FPGAs
Simon Johnston, Girijesh Prasad, Liam Maguire, Martin McGinnity ........................................ 269

HYDRA: From Cellular Biology to Shape-Changing Artefacts
Esben H. Østergaard, David J. Christensen, Peter Eggenberger, Tim Taylor, Peter Ottery, Henrik H. Lund .................. 275

The CIRCE Head: A Biomimetic Sonar System
Herbert Peremans, Jonas Reijniers ............................... 283

Tools for Address-Event-Representation Communication Systems and Debugging
M. Rivas, F. Gomez-Rodriguez, R. Paz, A. Linares-Barranco, S. Vicente, D. Cascado .............................. 289

New Ears for a Robot Cricket
Ben Torben-Nielsen, Barbara Webb, Richard Reeve ................ 297

Reinforcement Learning in MirrorBot
Cornelius Weber, David Muse, Mark Elshaw, Stefan Wermter .... 305

Evolutionary and Other Biological Inspirations

Varying the Population Size of Artificial Foraging Swarms on Time Varying Landscapes
Carlos Fernandes, Vitorino Ramos, Agostinho C. Rosa ................ 311

Lamarckian Clonal Selection Algorithm with Application
Wuhong He, Haifeng Du, Licheng Jiao, Jing Li .................. 317

Analysis for Characteristics of GA-Based Learning Method of Binary Neural Networks
Tatsuya Hirane, Tetsuya Toryu, Hidehiro Nakano, Arata Miyauchi ... 323

Immune Clonal Selection Wavelet Network Based Intrusion Detection
Fang Liu, Lan Luo .................................................. 331

Investigation of Evolving Populations of Adaptive Agents
Vladimir G. Red’ko, Oleg P. Mosalov, Danil V. Prokhorov ............ 337

Enhancing Cellular Automata by an Embedded Generalized Multi-layer Perceptron
Giuseppe A. Trunfio .................................................. 343
Intelligent Pattern Generation for a Tactile Communication System

C. Wilks, R. Eckmiller .................................................. 349

Self-organizing Maps and Their Applications

Self-organizing Map Initialization

Mohammed Attik, Laurent Bougrain, Frédéric Alexandre ............. 357

Principles of Employing a Self-organizing Map as a Frequent Itemset Miner

Vicente O. Baez-Monroy, Simon O’Keefe ........................................ 363

Spatio-Temporal Organization Map: A Speech Recognition Application

Zouhour Neji Ben Salem, Feriel Mouria-beji, Farouk Kamoun ........ 371

Residual Activity in the Neurons Allows SOMs to Learn Temporal Order

Pascual Campoy, Carlos J. Vicente .................................................. 379

Ordering of the RGB Space with a Growing Self-organizing Network. Application to Color Mathematical Morphology

Francisco Flórez-Revuelta ................................................................. 385

SOM of SOMs: Self-organizing Map Which Maps a Group of Self-organizing Maps

Tetsuo Furukawa ................................................................. 391

The Topographic Product of Experts

Colin Fyfe ................................................................. 397

Self Organizing Map (SOM) Approach for Classification of Power Quality Events

Emin Germen, D. Gökhan Ece, Ömer Nezih Gerek .......................... 403

SOM-Based Method for Process State Monitoring and Optimization in Fluidized Bed Energy Plant

Mikko Heikkinen, Ari Kettunen, Eero Niemitalo, Reijo Kuivalainen, Yrjö Hiltunen .................................................. 409

A New Extension of Self-optimizing Neural Networks for Topology Optimization

Adrian Horzyk ................................................................. 415

A Novel Technique for Data Visualization Based on SOM

Guanglan Liao, Tielin Shi, Shiyuan Liu, Jianping Xuan .................. 421
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Properties of Lattices Affect Topographic Error in Self-organizing Maps</td>
<td>Antonio Neme, Pedro Miramontes</td>
<td>427</td>
</tr>
<tr>
<td>Increasing Reliability of SOMs’ Neighbourhood Structure with a Bootstrap Process</td>
<td>Patrick Rousset, Bertrand Maillet</td>
<td>433</td>
</tr>
<tr>
<td><strong>Computer Vision</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artificial Neural Receptive Field for Stereovision</td>
<td>Boguslaw Cyganek</td>
<td>439</td>
</tr>
<tr>
<td>Pattern Detection Using Fast Normalized Neural Networks</td>
<td>Hazem M. El-Bakry</td>
<td>447</td>
</tr>
<tr>
<td>Neural Network Model for Extracting Optic Flow</td>
<td>Kunihiro Fukushima, Kazuya Tohyama</td>
<td>455</td>
</tr>
<tr>
<td>Fast Color-Based Object Recognition Independent of Position and Orientation</td>
<td>Martijn van de Giessen, Jürgen Schmidhuber</td>
<td>469</td>
</tr>
<tr>
<td>Class-Specific Sparse Coding for Learning of Object Representations</td>
<td>Stephan Hasler, Heiko Wersing, Edgar Körner</td>
<td>475</td>
</tr>
<tr>
<td>Neural Network Based Adult Image Classification</td>
<td>Wonil Kim, Han-Ku Lee, Seong Joon Yoo, Sung Wook Baik</td>
<td>481</td>
</tr>
<tr>
<td>Online Learning for Object Recognition with a Hierarchical Visual Cortex Model</td>
<td>Stephan Kirstein, Heiko Wersing, Edgar Körner</td>
<td>487</td>
</tr>
<tr>
<td>Extended Hopfield Network for Sequence Learning: Application to Gesture Recognition</td>
<td>André Maurer, Micha Hersch, Aude G. Billard</td>
<td>493</td>
</tr>
<tr>
<td>Accurate and Robust Image Superresolution by Neural Processing of Local Image Representations</td>
<td>Carlos Miravet, Francisco B. Rodríguez</td>
<td>499</td>
</tr>
</tbody>
</table>
The Emergence of Visual Object Recognition
Alessio Plebe, Rosaria Grazia Domenella .................. 507

Implicit Relevance Feedback from Eye Movements
Jarkko Salojärvi, Kai Puolamäki, Samuel Kaski ................ 513

Image Segmentation by Complex-Valued Units
Cornelius Weber, Stefan Wermter .................. 519

Cellular Neural Networks for Color Image Segmentation
Anna Wilbik ........................................ 525

Image Segmentation Using Watershed Transform and Feed-Back Pulse
Coupled Neural Network
Yiyan Xue, Simon X. Yang .................. 531

Adaptive Switching Median Filter with Neural Network Impulse
Detection Step
Pavel S. Zvonarev, Ilia V. Apalkov, Vladimir V. Khryashchev,
Andrey L. Priorov ............................. 537

Face Recognition and Detection

Human Face Detection Using New High Speed Modular Neural
Networks
Hazem M. El-Bakry ............................. 543

Face Detection Using Convolutional Neural Networks and Gabor
Filters
Bogdan Kwolek ................................ 551

Face Identification Performance Using Facial Expressions as
Perturbation
Minoru Nakayama, Takashi Kumakura ........................ 557

Discriminative Common Images for Face Recognition
Vo Dinh Minh Nhat, Sungyoung Lee .................. 563

Classification of Face Images for Gender, Age, Facial Expression, and
Identity
Torsten Wilhelm, Hans-Joachim Böhme,
Horst-Michael Gross ............................. 569
Sound and Speech Recognition

Classifying Unprompted Speech by Retraining LSTM Nets
Nicole Beringer, Alex Graves, Florian Schiel, Jürgen Schmidhuber ........................................ 575

Temporal Sound Processing by Cochlear Nucleus Octopus Neurons
Werner Hemmert, Marcus Holmberg, Ulrich Ramacher ............... 583

A SOM Based 2500 - Isolated - Farsi - Word Speech Recognizer
Jalil Shirazi, M.B. Menhaj .............................................. 589

Training HMM/ANN Hybrid Speech Recognizers by Probabilistic Sampling
László Tóth, A. Kocsor ................................................. 597

Chord Classifications by Artificial Neural Networks Revisited: Internal Representations of Circles of Major Thirds and Minor Thirds
Vanessa Yaremchuk, Michael R.W. Dawson ....................... 605

Bioinformatics

Biclustering Gene Expression Data in the Presence of Noise
Ahsan Abdullah, Amir Hussain ...................................... 611

Gene Extraction for Cancer Diagnosis by Support Vector Machines – An Improvement and Comparison with Nearest Shrunken Centroid Method
Te-Ming Huang, Vojislav Kecman ................................... 617

High-Throughput Multi-Dimensional Scaling (HiT-MDS) for cDNA-Array Expression Data
M. Strickert, S. Teichmann, N. Sreenivasulu, U. Seiffert ........ 625

Biomedical Applications

Comparing Neural Network Architecture for Pattern Recognize System on Artificial Noses
Aida A. Ferreira, Teresa B. Ludermir, Ronaldo R.B. de Aquino ...... 635

Medical Document Categorization Using a Priori Knowledge
Lukasz Itert, Włodzisław Duch, John Pestian ....................... 641
A Neurofuzzy Methodology for the Diagnosis of Wireless-Capsule Endoscopic Images
   Vassilis Kodogiannis, H.S. Chowdrey ....................... 647

Neural Network Use for the Identification of Factors Related to Common Mental Disorders
   T.B. Ludermir, C.R.S. Lopes, A.B. Ludermir, M.C.P. de Souto ...... 653

Development and Realization of the Artificial Neural Network for Diagnostics of Stroke Type
   O.Yu. Rebrova, O.A. Ishanov .................................. 659

Special Session: Information-Theoretic Concepts in Biomedical Data Analysis

A First Attempt at Constructing Genetic Programming Expressions for EEG Classification
   César Estébanez, José M. Valls, Ricardo Aler, Inés M. Galván ...... 665

SOM-Based Wavelet Filtering for the Exploration of Medical Images
   Birgit Lessmann, Andreas Degenhard, Preminda Kessar,
   Linda Pointon, Michael Khazen, Martin O. Leach,
   Tim W. Nattkemper ............................................ 671

Functional MRI Analysis by a Novel Spatiotemporal ICA Algorithm
   Fabian J. Theis, Peter Gruber, Ingo R. Keck, Elmar W. Lang ...... 677

Early Detection of Alzheimer’s Disease by Blind Source Separation,
Time Frequency Representation, and Bump Modeling of EEG Signals
   François Vialatte, Andrzej Cichocki, Gérard Dreyfus,
   Toshimitsu Musha, Sergei L. Shishkin, Rémi Gervais ............. 683

Acknowledgements to the Reviewers ............................ 693

Author Index .................................................... 697