

Bruno Apolloni Maria Marinaro  
Roberto Tagliaferri (Eds.)

# Neural Nets

14th Italian Workshop on Neural Nets, WIRN VIETRI 2003  
Vietri sul Mare, Italy, June 4-7, 2003  
Revised Papers



Springer

## Series Editors

Gerhard Goos, Karlsruhe University, Germany  
Juris Hartmanis, Cornell University, NY, USA  
Jan van Leeuwen, Utrecht University, The Netherlands

## Volume Editors

Bruno Apolloni  
Università di Milano, Dipartimento di Scienze dell'Informazione  
Via Comelico 39/41, 20135 Milano, Italy  
E-mail: apolloni@dsi.unimi.it

Maria Marinaro  
Università di Salerno, Dipartimento di Fisica  
Via S. Allende, 84081 Baronissi (Salerno), Italy  
E-mail: iass.vietri@tin.it

Roberto Tagliaferri  
Università di Salerno, Dipartimento di Matematica ed Informatica  
Via S. Allende, 84081 Baronissi (Salerno), Italy  
E-mail: rtagliaferri@unisa.it

## Cataloging-in-Publication Data applied for

A catalog record for this book is available from the Library of Congress.

Bibliographic information published by Die Deutsche Bibliothek  
Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie;  
detailed bibliographic data is available in the Internet at <<http://dnb.ddb.de>>.

CR Subject Classification (1998): F.1.1, I.2.6, B.6.1, C.1, J.3, I.4, G.3, H.2.8

ISSN 0302-9743

ISBN 3-540-20227-7 Springer-Verlag 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-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York  
a member of BertelsmannSpringer Science+Business Media GmbH

<http://www.springer.de>

© Springer-Verlag Berlin Heidelberg 2003  
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Olgun Computergrafik  
Printed on acid-free paper SPIN: 10958469 06/3142 5 4 3 2 1 0

# Table of Contents

---

## I Eduardo R. Caianiello Lecture

---

- Nonparametric Hidden Markov Models: Principles and Applications  
to Speech Recognition ..... 3  
*Edmondo Trentin*

---

## II Models

---

- Cooperative Games in a Stochastic Environment ..... 25  
*Bruno Apolloni, Simone Bassis, Sabrina Gaito, and Dario Malchiodi*
- Lattice Models for Context-Driven Regularization in Motion Perception... 35  
*Silvio P. Sabatini, Fabio Solari, and Giacomo M. Bisio*
- On the Dynamics of Scale-Free Boolean Networks ..... 43  
*Roberto Serra, Marco Villani, and Luca Agostini*

---

## III Architectures and Algorithms

---

- A Deterministic Learning Approach Based on Discrepancy ..... 53  
*Cristiano Cervellera and Marco Muselli*
- An Hybrid Neural/Genetic Approach  
to Continuous Multi-objective Optimization Problems ..... 61  
*Mario Costa, Edmondo Minisci, and Eros Pasero*
- An Algorithm to Model Paradigm Shifting in Fuzzy Clustering ..... 70  
*Francesco Masulli and Stefano Rovetta*
- ANFIS Synthesis by Hyperplane Clustering for Time Series Prediction .... 77  
*Massimo Panella, Fabio Massimo Frattale Mascioli,  
Antonello Rizzi, and Giuseppe Martinelli*
- Generalized Splitting 2D Flexible Activation Function ..... 85  
*Francesca Vitagliano, Raffaele Parisi, and Aurelio Uncini*

---

## IV Image and Signal Processing

---

- Face Localization with Recursive Neural Networks ..... 99  
*Monica Bianchini, Marco Gori, Paolo Mazzoni, Lorenzo Sarti,  
and Franco Scarselli*

Multi-class Image Coding via EM-KLT Algorithm.....	106
<i>Alessandra Budillon and Francesco Palmieri</i>	
A Face Detection System Based on Color and Support Vector Machines...	113
<i>Elena Casiraghi, Raffaella Lanzarotti, and Giuseppe Lipori</i>	
A Neural Architecture for 3D Segmentation .....	121
<i>Antonio Chella, Umberto Maniscalco, and Roberto Pirrone</i>	
Automatic Polyphonic Piano Music Transcription by a Multi-classification Discriminative-Learning .....	129
<i>Stefano D'Urso and Aurelio Uncini</i>	
An Adaptive Learning Algorithm for ECG Noise and Baseline Drift Removal .....	139
<i>Anna Esposito and Pierluigi D'Andria</i>	
Towards an Automatic Lesion Segmentation Method for Dual Echo Magnetic Resonance Images Using an Ensemble of Neural Networks .....	148
<i>Andreas Hadjiprocopis and Paul Tofts</i>	
A Probabilistic Neural Networks System to Recognize 3D Face of People ..	158
<i>Giancarlo Mauri and Italo Zoppis</i>	
Dereverberation of Acoustic Signals by Independent Component Analysis .	165
<i>Claudio Sistopoli, Raffaele Parisi, and Aurelio Uncini</i>	

---

## V Applications

---

Supervised and Unsupervised Analysis Applied to Strombolian E.Q. ....	173
<i>Cinzia Avossa, Flora Giudicepietro, Maria Marinaro, and Silvia Scarpetta</i>	
Intracranial Pressure Signal Processing by Adaptive Fuzzy Network .....	179
<i>Bruno Azzerboni, Mario Carpentieri, Maurizio Ipsale, Fabio La Foresta, and Francesco Carlo Morabito</i>	
Soft Computing Techniques for Classification of Bronze Age Axes .....	187
<i>Lara Giordano, Claude Albore Livadie, Giovanni Paternoster, Raffaele Rinzivillo, and Roberto Tagliaferri</i>	
Environmental Risk and Territorial Compatibility: A Soft Computing Approach .....	195
<i>Silvio Giove and Claudia Basta</i>	
Neural Network Approach for Estimation and Prediction of Time to Disruption in Tokamak Reactors.....	202
<i>Antonino Greco, Francesco Carlo Morabito, and Mario Versaci</i>	

A Concurrent Neural Classifier for HTML Documents Retrieval . . . . .	210
<i>Giovanni Pilato, Salvatore Vitabile, Giorgio Vassallo, Vincenzo Conti, and Filippo Sorbello</i>	
Bayesian Modelling for Packet Channels . . . . .	218
<i>Pierluigi Salvo Rossi, Gianmarco Romano, Francesco Palmieri, and Giulio Iannello</i>	
Neural Networks for Photometric Redshifts Evaluation . . . . .	226
<i>Roberto Tagliaferri, Giuseppe Longo, Stefano Andreon, Salvatore Capozziello, Ciro Donalek, and Gerardo Giordano</i>	

---

## VI Special Session on “Bioinformatics and Statistics” Chaired by Francesco Masulli

---

Prediction of Signal Peptide in Proteins with Neural Networks . . . . .	237
<i>Piero Fariselli, Giacomo Finocchiaro, and Rita Casadio</i>	
Proteomic Profiling of Inherited Breast Cancer: Identification of Molecular Targets for Early Detection, Prognosis and Treatment, and Related Bioinformatics Tools . . . . .	245
<i>Giovanni Cuda, Mario Cannataro, Barbara Quaresima, Francesco Baudi, Rita Casadonte, Maria Concetta Faniello, Pierosandro Tagliaferri, Pierangelo Veltri, Francesco Costanzo, and Salvatore Venuta</i>	
Browsing Large Pedigrees to Study of the Isolated Populations in the “Parco Nazionale del Cilento e Vallo di Diano” . . . . .	258
<i>Giuliano Antoniol, Michele Ceccarelli, Fabio Rollo, Wanda Longo, Teresa Nutile, Marina Ciullo, Enza Colonna, Antonietta Calabria, Maria Astore, Anna Lembo, Paola Toriello, and M. Grazia Persico</i>	
Monitoring of Car Driving Awareness from Biosignals . . . . .	269
<i>Bruno Apolloni, Simone Bassis, Andrea Brega, Sabrina Gaito, Dario Malchiodi, Norberto Valcamonica, and Anna Maria Zanaboni</i>	
Markov Analysis of Protein Sequence Similarities . . . . .	278
<i>Chakra Chennubhotla and Alberto Paccanaro</i>	
Divergence Projections for Variable Selection in Multi-layer Perceptron Networks . . . . .	287
<i>Antonio Eleuteri, Roberto Tagliaferri, and Leopoldo Milano</i>	
Large Scale Prediction of Protein Interactions by a SVM-Based Method . .	296
<i>Francesco Marangoni, Matteo Barberis, and Marco Botta</i>	

Gene Selection Using Random Voronoi Ensembles . . . . . 302  
*Francesco Masulli and Stefano Rovetta*

QSAR/QSPR Studies by Kernel Machines, Recursive Neural Networks  
and Their Integration . . . . . 308  
*Alessio Micheli, Filippo Portera, and Alessandro Sperduti*

An Application of Low Bias Bagged SVMs to the Classification  
of Heterogeneous Malignant Tissues . . . . . 316  
*Giorgio Valentini*

**VII Special Session on “Formats of Knowledge:  
words, images, narratives” Chaired by Maria Rita Ciceri**

Narrative Thought in Childhood and Adolescence Hierarchical Models  
of Story Composition and Interpretation . . . . . 325  
*Anne McKeough, Barb Wigmore-MacLeod, and Randy Genereux*

Degrees of Similarity in Knowledge Transfer . . . . . 338  
*Alessandro Antonietti and Claudio Maretti*

Formats and Languages of Knowledge:  
Models of Links for Learning Processes . . . . . 348  
*Maria Rita Ciceri*

Pictures and Words: Analogies and Specificity  
in Knowledge Organization . . . . . 358  
*Paola Colombo, Carla Antonietti, and Maria Rita Ciceri*

Emotional and Metaemotional Competence: A Developmental View . . . . . 367  
*Iliara Grazzani Gavazzi*

**Author Index** . . . . . 375