

Lecture Notes in Artificial Intelligence 2955

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Vito Di Gesù Francesco Masulli
Alfredo Petrosino (Eds.)

Fuzzy Logic and Applications

5th International Workshop, WILF 2003
Naples, Italy, October 9-11, 2003
Revised Selected Papers



Springer

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Vito Di Gesù
Università degli Studi di Palermo
Dipartimento di Matematica ed Applicazioni
Via Archirafi, 34, 90123 Palermo, Italy
E-mail: digesu@math.unipa.it

Francesco Masulli
Polo Universitario di La Spezia, DISI
Via Dodecaneso 35, 16146 Genoa, Italy
E-mail: masulli@disi.unige.it

Alfredo Petrosino
University of Naples "Parthenope"
Department of Applied Science
Via A. De Gasperi 5, 80131 Naples, Italy
E-mail: alfredo.petrosino@uniparthenope.it

Library of Congress Control Number: 2005938510

CR Subject Classification (1998): I.2.3, I.5, F.4.1, F.1, F.2, G.2, I.2, I.4

LNCS Sublibrary: SL 7 – Artificial Intelligence

ISSN	0302-9743
ISBN-10	3-540-31019-3 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-31019-8 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2006
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 10983652 06/3142 5 4 3 2 1 0

Preface

The present volume contains the contributions delivered at the 5th International Workshop on Fuzzy Logic and Applications (WILF 2003), hosted by the Istituto Italiano Studi Filosofici, Palazzo Serra di Cassano, Naples (Italy) and held on October 9-11, 2003.

The volume includes the more recent achievements in the domain of theoretical, experimental and applied fuzzy logic and related techniques. To emphasize the particular connotation of the modern applications of fuzzy logic, special attention has been devoted to the recent trend of integrating and complementing fuzzy logic with rough set theory, neural networks, genetic algorithms and other formal theories and methodologies in order to define flexible and “intelligent” systems, based on the so-called paradigm of soft computing. The capability of these techniques to incorporate imprecision and incomplete information, and to model complex systems, makes them useful tools in many scientific areas.

Among these areas, WILF 2003 dedicated a Special Session on “Soft Computing in Image Processing.” Image processing has been a major topic in many areas of research and development, particularly in computer vision and pattern recognition. The majority of the methods were based on probabilistic paradigms, such as the well-known Bayesian paradigm and evidence-based decision-making systems, and just recently soft-computing techniques have gained a relevant role in the leading techniques to tackle image-processing problems. The special session was organized in cooperation with the SCIP group (<http://fuzzy.rug.ac.be/SCIP>).

The volume consists of peer-reviewed papers, selected out of more than 50 papers submitted to the workshop and given as oral contributions at the workshop. The conference also included three presentations from keynote speakers, Isabelle Bloch from ENST, France, Antonio Di Nola from the University of Salerno, Italy, and Sankar Pal from the Indian Statistical Institute, India.

Thanks are due to Programm Committee Members and Referees, who took care of the unexpected load of reviewing work. Thanks are also due to the sponsors, with special mention of Antonio Gargano and Gerardo Marotta, director and president of IISF respectively, for supporting the workshop with their financial and organizational help.

Vito Di Gesù, Francesco Masulli and Alfredo Petrosino
Program Chairs
WILF 2003

Organization

WILF 2003 was jointly organized by the Istituto Italiano Studi Filosofici, IISF, the IEEE Neural Networks Society - Italian RIG, the INNS International Neural Network Society, SIG Italy, and SIREN, and by the National Group of Scientific Computing (GNCS), Italy

Executive Committee

Conference Chairs:

Vito Di Gesù (University of Palermo, Italy)

Francesco Masulli (University of Pisa, Italy)

Alfredo Petrosino (University of Naples “Parthenope”, Italy)

Program Committee

Jim Bezdek (University of West Florida, USA)

Palma Blonda (CNR-Bari, Italy)

Andrea Bonarini (Politecnico di Milano, Italy)

Piero Bonissone (General Electric, USA)

Ernesto Damiani (University of Milano, Italy)

Antonio Di Nola (University of Salerno, Italy)

Silvio Giove (University of Venezia, Italy)

Marco Gori (University of Siena, Italy)

Ugur Halici (METU, Ankara, Turkey)

Jim Keller (University of Missouri-Columbia, USA)

Etienne Kerre (Ghent University, Belgium)

Ludmilla Kuncheva (University of Wales, UK)

Carlo Morabito (University of Reggio Calabria, Italy)

Gabriella Pasi (CNR-Milano, Italy)

Witold Pedrycz (University of Alberta, Canada)

Roberto Tagliaferri (University of Salerno, Italy)

Settimo Termini (University of Palermo and CNR-Naples, Italy)

Ronald Yager (Iona College, New York, USA)

Hans-Jürgen Zimmermann (RWTH-Aachen, Germany)

Sponsoring Institutions

Istituto Italiano Studi Filosofici (IISF), Naples, Italy

National Group of Scientific Computing (GNCS), Italy

ICAR, National Research Council, Section of Naples, Italy

Table of Contents

Fuzzy Sets and Systems

Rough-Fuzzy Granular Computing, Case Based Reasoning and Data Mining	
<i>Sankar K. Pal</i>	1
VHDL High Level Modelling and Implementation of Fuzzy Systems	
<i>A. Barriga, S. Sanchez-Solano, P. Brox, A. Cabrera, I. Baturone</i>	11
Some Complexity Results on Fuzzy Description Logics	
<i>Piero A. Bonatti, Andrea G.B. Tettamanzi</i>	19
An Evolutionary Approach to Ontology-Based User Model Acquisition	
<i>Célia da Costa Pereira, Andrea G.B. Tettamanzi</i>	25
Mathematical Modeling of Passage Dynamic Function	
<i>Anna Esposito, Eugène C. Ezin, Maria Marinaro</i>	33
Bi-monotonic Fuzzy Sets Lead to Optimal Fuzzy Interfaces	
<i>Giovanna Castellano, Anna M. Fanelli, Corrado Mencar</i>	39
Conversational Agent Model in Intelligent User Interface	
<i>Francesco Rago</i>	46
A Fuzzy Frame-Based Knowledge Representation Formalism	
<i>Andrea G.B. Tettamanzi</i>	55
Statistical Analysis of the Different Operator Involved in the Fuzzy Inference Process	
<i>O. Valenzuela, I. Rojas, F. Rojas</i>	63

Fuzzy Control

Concepts and Fuzzy Models for Behavior-Based Robotics	
<i>Andrea Bonarini, Matteo Matteucci, Marcello Restelli</i>	72
Mathematical Aspects of Fuzzy Control	
<i>Paolo Amato, Antonio Di Nola, Mirko Navara</i>	80

Piecewise Linear Fuzzy Sliding Mode Control <i>Mariagrazia Dotoli, Biagio Turchiano</i>	89
--	----

Application of Fuzzy Logic Controllers for Laser Tracking with Autonomous Robot System <i>Jia Lu, Yunxia Hu</i>	97
---	----

Neuro-fuzzy Systems

Fuzzy Relational Neural Network for Data Analysis <i>Angelo Ciaramella, Roberto Tagliaferri, Witold Pedrycz,</i> <i>Antonio Di Nola</i>	103
---	-----

A Neuro-fuzzy System for the Prediction of the Vehicle Traffic Flow <i>Massimo Panella, Antonello Rizzi, Fabio Massimo Frattale Mascioli,</i> <i>Giuseppe Martinelli</i>	110
--	-----

On the Use of Neuro-fuzzy Techniques for Analyzing Experimental Surface Electromyographic Data <i>Domenico Costantino, Francesco Carlo Morabito, Mario Versaci</i>	119
---	-----

Linear Regression Model-Guided Clustering for Training RBF Networks for Regression Problems <i>Antonino Staiano, Roberto Tagliaferri, Witold Pedrycz</i>	127
--	-----

Fuzzy Decision Theory and Application

An Iterative Algorithm for Fuzzy Quadratic Programming Problems <i>Silvio Giove</i>	133
--	-----

A General Defuzzification Method for Fuzzy Total Cost in an Inventory Without Backorder Case <i>Gisella Facchinetti, Nicoletta Pacchiarotti</i>	140
---	-----

Fuzzy Rough Sets and Multiple-Premise Gradual Decision Rules <i>Salvatore Greco, Masahiro Inuiguchi, Roman Slowinski</i>	148
---	-----

Soft Computing in Image Processing

Fuzzy Spatial Relationships for Model-Based Pattern Recognition in Images and Spatial Reasoning Under Imprecision <i>Isabelle Bloch</i>	164
---	-----

Classification of Digital Terrain Models Through Fuzzy Clustering: An Application <i>G. Antoniol, M. Ceccarelli, A. Maratea, F. Russo</i>	174
Evolutionary Approach to Inverse Planning in Coplanar Radiotherapy <i>V. Bevilacqua, G. Mastronardi, G. Piscopo</i>	183
Soft Pyramid Symmetry Transforms <i>Bertrand Zavidovique, Vito Di Gesù</i>	191
Image File Compression Using Approximation and Fuzzy Logic <i>Antonio Di Nola, Barnabás Bede</i>	200
Fuzzy Information Fusion Scheme Used to Segment Brain Tumor from MR Images <i>Weibei Dou, Su Ruan, Qingmin Liao, Daniel Bloyet, Jean-Marc Constans, Yanping Chen</i>	208
Out-of-Core Segmentation by Deformable Models <i>Gilson Giralaldi, Leandro Schaefer, Ricardo Farias, Rodrigo Silva</i>	216
Rough Set Approach for Classification of Breast Cancer Mammogram Images <i>Aboul Ella Hassanien, Jafar M. Ali</i>	224
Genetic Fourier Descriptor for the Detection of Rotational Symmetry <i>Raymond K.K. Yip</i>	232
Fourier Transform Based Column-Block and Row-Block Matching Procedure for Document Image Mosaicing <i>P. Shivakumara, G. Hemantha Kumar, D.S. Guru, P. Nagabhushan</i>	240
Object Recognition by Recursive Learning of Multiscale Trees <i>Luca Lombardi, Alfredo Petrosino</i>	255
An Integrated Fuzzy Cells-Classifier <i>Giosuè Lo Bosco</i>	263
A Neural Network for Classification of Chambers Arrangement in Foraminifera <i>Roberto Marmo, Sabrina Amodio</i>	271
Fuzzy Concepts in Vector Quantization Training <i>Francesco Masulli, Stefano Rovetta</i>	279

Some Component Analysis Based on Fuzzy Relational Structure <i>Hajime Nobuhara, Kaoru Hirota</i>	289
Fuzzy Technique Based Recognition of Handwritten Characters <i>R.M. Suresh, S. Arumugam</i>	297
Optical Flow Estimation Using Genetic Algorithms <i>Marco Tagliasacchi</i>	309
Neural Network Ensemble and Support Vector Machine Classifiers: An Application to Remote Sensed Data <i>C. Tarantino, A. D'Addabbo, L. Castellana, P. Blonda, G. Pasquariello, N. Ancona, G. Satalino</i>	317
Combining Neighbourhood-Based and Histogram Similarity Measures for the Design of Image Quality Measures <i>Dietrich Van der Weken, Mike Nachtegael, Etienne Kerre</i>	324
An Automated Image Thresholding Scheme for Highly Contrast-Degraded Images Based on α -Order Fuzzy Entropy <i>Ioannis K. Vlachos, George D. Sergiadis</i>	332
Author Index	341