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Prof. Cornelia A. Bulucea, University of Craiova, Romania

Prof. Valeri Mladenov, Technical University of Sofia, Bulgaria

Prof. Emil Pop, University of Petrosani, Romania

Prof. Monica Leba, University of Petrosani, Romania

Prof. Nikos Mastorakis, Technical University of Sofia, Bulgaria

RECENT ADVANCES in COMPUTATIONAL INTELLIGENCE,

MAN-MACHINE SYSTEMS and CYBERNETICS



**Proceedings of the 8th WSEAS International Conference on
COMPUTATIONAL INTELLIGENCE, MAN-MACHINE SYSTEMS
and CYBERNETICS (CIMMACS '09)**

**Puerto De La Cruz, Tenerife, Canary Islands, Spain,
December 14-16, 2009**

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A Series of Reference Books and Textbooks**

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Preface

This year the 8th WSEAS International Conference on COMPUTATIONAL INTELLIGENCE, MAN-MACHINE SYSTEMS and CYBERNETICS (CIMMACS '09) was held at Puerto De La Cruz, Tenerife, Canary Islands, Spain, December 14-16, 2009. The conference remains faithful to its original idea of providing a platform to discuss computational intelligence, man-machine systems and cybernetics etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

Table of Contents

<u>Plenary Lecture 1: Audio Interaction with Multimedia Information</u>	13
<i>Mario Malcangi</i>	
<u>Plenary Lecture 2: Developing Mathematical Techniques for Clustering Fuzzy Relational Data</u>	14
<i>Narcis Clara</i>	
<u>Technology and Equipment for Complex Surfaces Nanofinishing by Abrasive Flow Machining with Reopectic Work Mediums</u>	15
<i>Valeriu Avramescu, Roxana Grejdanescu, Gheorghe Orasanu, Catalin Horia Orasanu, Loredana Theodora Paun, Norvegia Elena Avramescu</i>	
<u>Gammachirp Filterbank Based Speech Analysis for Speaker Identification</u>	19
<i>Mouslem Bouchamekh, Boualem Bousseksou, Daoud Berkani</i>	
<u>Simple, Real-Time Obstacle Avoidance Algorithm for Mobile Robots</u>	24
<i>Ioan Susnea, Viorel Minzu, Grigore Vasiliu</i>	
<u>Review of Existing Algorithms for Face Detection and Recognition</u>	30
<i>Nurulhuda Ismail, Mas Idayu Md. Sabri</i>	
<u>Grasp Registration and Learning in Virtual Reality Environments</u>	40
<i>Enrique Valero, Antonio Adan</i>	
<u>Mobile to Server Face Recognition: A Proposed System for Social Situations In Malaysia</u>	48
<i>Nurulhuda Ismail, Mas Idayu Md. Sabri</i>	
<u>A Product Control Using the Cellular Data System</u>	57
<i>Toshio Kodama, Toshiyasu L. Kunii, Yoichi Seki</i>	
<u>Development Of Classifier for Anesthesia Depth Index Using Power Spectrum Analysis of EEG</u>	65
<i>H. L. Lee, S. Y. Ye, J. M. Park, G. R. Jeon</i>	
<u>Developed System of Fall Down Estimation Using a Bi-Axial Gyro Sensor</u>	69
<i>Myung-Chul Kim, Soo-Young Ye, Dong-Kun Jung, Jung Hoon Ro, Gye Rok Jeon</i>	
<u>Detrended Fluctuaton Analysis of EEG on a Depth of Anesthesia</u>	73
<i>Ye Soo-Young, Baik Seong-Wan, Jeon Gye-Rok</i>	
<u>Theoretical Study of Static Behavior for a Multifunctional Machine Structure Made by Composite Material</u>	77
<i>Loredana Theodora Paun, Roxana Grejdenescu, Valeriu Avramescu, Nita Raluca, Constantin Dogariu</i>	
<u>Finite-State Machine Based Distributed Framework DATA for Intelligent Ambience Systems</u>	80
<i>Matej Rojc, Izidor Mlakar</i>	
<u>Bacteria Classification Based on 16S Ribosomal Gene Using Artificial Neural Networks</u>	86
<i>Susan Higashi, Mariangela Hungria, Maria A. de O. C. Brunetto</i>	
<u>Alignment of Visual Maps in Multirobot FastSLAM</u>	92
<i>Monica Ballesta, Arturo Gil, Oscar Reinoso, Miguel Julia, Luis M. Jimenez</i>	

<u>Transformation-Based Part-Of-Speech Tagging For Serbian Language</u>	98
<i>Vlado Delic, Milan Secujski, Aleksandar Kupusinac</i>	
<u>System for a Blood Pressure Measurement Algorithm Development</u>	104
<i>J. Y. Yoo, S. M. Park, S. Y. Ye, G. R. Jeon</i>	
<u>Prediction of Prostate Capsule Penetration Using Neural Networks</u>	108
<i>Corina Botoca, Razvan Bardan, Mircea Botoca, Florin Alexa</i>	
<u>Virtual Reality Simulator for Sonification Studies</u>	112
<i>M. A. Torres-Gil, O. Casanova-Gonzalez, J. L. Gonzalez-Mora</i>	
<u>An Efficient use of Support Vector Machines for Speech Signal Classification</u>	117
<i>Balwant A. Sonkamble, D. D. Doye, Sulochana Sonkamble</i>	
<u>Operational Transport Planning in an Automobile Supply Chain: An Interactive Fuzzy Multi-Objective Approach</u>	121
<i>David Peidro, Manuel Diaz-Madronero, Josefa Mula</i>	
<u>Automating Execution of Web Services for Ontology Based Information Integration</u>	128
<i>Bostjan Grasic, Vili Podgorelec</i>	
<u>Computer Solutions on Sensory Substitution for Sensory Disabled People</u>	134
<i>Antonio Francisco Rodriguez Hernandez, Carlos Merino Gracia, Oscar Casanova Gonzalez, Cristian Modrono Pascual, Miguel Angel Torres Gil, Raquel Montserrat, Enrique Burunat Gutierrez, Jose Luis Gonzalez-Mora</i>	
<u>Gel Image Matching Based on Local Homography Constraints</u>	139
<i>Ankhubayar Yukhuu, Young Sup Hwang</i>	
<u>Multi-Agents Based Protocols for Negotiation in a Crisis Management Supply Chain</u>	143
<i>A. Kaddouci, H. Zgaya, S. Hammadi, F. Bretaudeau</i>	
<u>A Framework for Mixed-Language Text-to-Speech Synthesis</u>	151
<i>Mario Malcangi, Philip Grew</i>	
<u>Aspects Regarding the Motion Possibilities of a CNC Multifunctional Machine-Tool</u>	155
<i>Roxana Grejdanescu, Loredana Paun, Valeriu Avramescu, Eugen Strajescu</i>	
<u>Search for Kriging Approximation in Cement Paste Performance</u>	158
<i>Matej Leps, Martina Valtrova</i>	
<u>Optimised Homotropic Structuring Element for Handwriting Characters Skeleton</u>	164
<i>Dan L. Lacrama, Florin Alexa</i>	
<u>Radio Resources Dimensioning According to Different Allocation Strategies in GSM/GPRS Networks</u>	168
<i>Georgeta Budura, Cornel Balint, Adrian Budura</i>	
<u>A New Approximating Model for the Time Invariant Nonlinear Operators with Fading Memory</u>	174
<i>Adrian Budura, Silviu Crisan, Georgeta Budura</i>	

<u>Grammatical Swarm and Particle Swarm Optimization Models Applied to Neural Network Learning and Topology Definition</u>	180
<i>Nuria Gomez, Luis F. Mingo, Juan Garitagoitia, Victor Martinez, Jose A. Calvo Manzano</i>	
<u>Cascade Granular Networks for Human-Centric Systems</u>	186
<i>Keun-Chang Kwak</i>	
<u>Application of Self-Organizing Mapping Neural Network for Discovery of Market Behavior of Equity Fund</u>	190
<i>Jen-Hua Chen , Chiung-Fen Huang , An-Pin Chen</i>	
<u>Audio Interaction with Multimedia Information</u>	196
<i>Mario Malcangi</i>	
<u>Fuzzy Diagnostic System for Railway Bridges</u>	200
<i>Petr Rudolf, Jaroslav Mencik, Jiri Krupka</i>	
<u>Authors Index</u>	206

Plenary Lecture 1

Audio Interaction with Multimedia Information



Professor Mario Malcangi

Universita degli Studi di Milano

DICo – Dipartimento di Informatica e Comunicazione

Via Comelico 39, 20135 Milano

Italy

E-mail: malcangi@ dico.unimi.it

Abstract: Interacting with multimedia information stored in systems or on the web, points up several difficulties inherent in the signal nature of such information. These difficulties are especially evident when palmtop devices are used for such purpose. Developing and integrating a set of algorithms designed for extracting audio information is a primary step toward providing user-friendly access to multimedia information and the developing of powerful communication interfaces. Audio has several advantages over other communication media. These include: hands-free operation; unattended interaction; simple, cheap devices for capture and playback; etc.

A set of algorithms and processes for extracting semantic and syntactic information from audio signals, including voice, has been defined. The extracted information is used to access information in multimedia databases, as well as to index them. More extensive higher-level information need to be extracted from the audio signal, such as audio-source identification (speaker identification) and genre in musical audio. A primary task involve transforming audio to symbols (e.g. music transformed into score, speech transformed into text) and transcribing symbols to audio (e.g. score transformed into musical audio, text transformed into speech). The purpose is to search for and access any kind of multimedia information by means of audio.

To attain these results, digital audio processing, digital speech processing and soft-computing methods need to be integrated.

Brief Biography of the Speaker:

M. Malcangi graduated in Computer Engineering from the Politecnico di Milano in 1981. His research is in the areas of speech processing and digital audio processing. He teaches Digital Signal Processing and Digital Audio Processing at the Universita degli Studi di Milano. He has published several papers on topics in digital audio and speech processing. His current research efforts focus primarily on applying soft-computing methodologies (neural networks and fuzzy logic) to speech synthesis, speech recognition, and speaker identification, where deeply embedded systems are the platform that supports the application processing.

Plenary Lecture 2

Developing Mathematical Techniques for Clustering Fuzzy Relational Data



Associate Professor Narcis Clara
Informatica i Matemàtica Aplicada

Universitat de Girona

Campus de Montilivi, Ed. PIV Escola Politécnica Superior 17071

Catalonia, Spain

E-mail: narcis.clara@udg.edu

Abstract: Fuzzy clustering methods using objective functions and solving optimization problems for clustering object data have been very developed, and some of them with a great success as the fuzzy c-means families or hybrid clustering models. Even so, we will focus our attention in fuzzy cluster analysis for relational data which presents a more algebraic structure because generally deals with concepts as decomposition of matrices, fuzzy proximity relations or transitive closures.

One of the most applied fuzzy clustering methods for relational data is the single linkage, which coincides with the transitive closure by the t-norm of the minimum. This method establishes very suitable mathematical properties but sometimes presents inappropriate results, keeping all the objects separated or merging all the objects in only a cluster. Some authors have surpassed these difficulties, improving the results, using the transitive closure by another t-norm, but, unfortunately, appearing other inadequate properties.

We have developed another general procedure in order to try to avoid these difficulties, integrating in a homogeneous methodology the three main steps that are compulsory for clustering, namely: to define the similarity between objects, how to relate the similarity between objects and between clusters, and, finally, the own clustering method. Many fuzzy similarity indexes are defined applying crisp properties. Defining the similarity without this requirement we can also establish the theoretical mathematical bases for ensure that the corresponding index of similarity defines a proximity relation, showing that is essential for this purpose the algebraic structure of the t-norm. Defining the clusters as elements of the same referential space where belong the data we are able to implement an algorithm, based only on the fuzzy cardinality of the fuzzy subsets that describe the objects, which shows promising results.

Brief Biography of the Speaker:

Narcis Clara is Associate Professor of the Department of Computing and Applied Mathematics of the Higher Polytechnic School at the University of Girona. He is graduated in Mathematics for the University of Barcelona and he received the Ph. D. degree from the University of Girona. His research experience and interests are diverse and essentially cover the theory of fuzzy connectives, fuzzy additive generators of t-norms, fuzzy similarity measures, fuzzy clustering and complex systems. He is member of the Differential Equations, Modelling and Applications research group although he usually cooperates with other research groups for dealing with uncertainty in Economics and Management, and Chemical Engineering. He has participated in several projects mainly for developing new mathematical techniques for classification and prediction of environmental and economic variables based on fuzzy systems and neural networks. In collaboration with the Laboratory of Chemical and Environmental Engineering he has developed techniques of soft computing for predicting the quality of water at the effluent of a wastewater treatment plant. He has contributed in many subsidized university projects; papers published in edited books, peer-reviewed journals and international conference proceedings, and have served as a reviewer of International Conferences.