1997 Annual Meeting of the North American Fuzzy Information Processing Society - NAFIPS

September 21-24, 1997
Syracuse, New York, U.S.A.

Edited by
Can Isik
Valerie Cross

Sponsored by
NAFIPS - North American Fuzzy Information Processing Society

In Cooperation with
IEEE Neural Networks Council
IEEE Systems, Man and Cybernetics Society
IEEE Syracuse Section

Organizing Institution
Syracuse University, USA

97TH8297
## TABLE OF CONTENTS

### Decision

**Chair: C. Temponi**

- Building Agent Based Decision Support System Using Soft Computing Techniques  
  *B. Fazlollahi and R. Vahidov*  
  Page 1
- Using Fuzzy Cognitive Maps for Data Abstraction and Synthesis in Decision Making  
  *A K. Perusich and M. McNeese*  
  Page 5
- Fuzzy Logic Models of the Relationships among Communication Satisfaction Factors and Organizational Commitment in Three Australian Organizations  
  *A. Adrian*  
  Page 10
- On-line Decision Support Fuzzy Systems: An Application to Product Pricing  
  *R. Gomes, R. Pacheco, A. Martins, R. Weber and R. Barcia*  
  Page 15
- HOQ’s Implicit Requirements Assessment: A Fuzzy Logic-Based Method  
  *C. Temponi, J. Yen and W. Tiao*  
  Page 21

### Control

**Chair: B. Yuan**

- On Developing Enhanced Fuzzy Models for Nonlinear Process Control  
  *M. Hanss*  
  Page 27
- FADIS: An Integrated Development Environment for Automatic Design and Implementation of FLC  
  *D. Kim and I. Cho*  
  Page 33
- Some Generalizations of the Fuzzy Control Models  
  *B. Shukhat*  
  Page 40
- Fuzzy Modelling and Control Based on Maximum Entropy Self-Organizing Nets and Cell State Mapping  
  *H. Lin and C. Isik*  
  Page 45
- An Intelligent Fuzzy Control System  
  *B. Yuan and G. Zrilic*  
  Page 51

### Fuzzy Knowledge Engineering

**Chair: Rita De Caluwe**

- Functional Dependencies Revisited Under Graduality and Imprecision  
  *P. Bosc, L. Lietard and O. Pivert*  
  Page 57
- A Theoretical Model for Crisp and Fuzzy Time  
  *B. Van Der Cruyssen, R. De Caluwe, G. De Tre, and D. Vandycke*  
  Page 63
- Towards Temporal Fuzzy and Uncertain Object-Oriented Database Management Systems  
  *G. De Tre, R. De Caluwe, B. Van Der Cruyssen, N. Van Gyseghem*  
  Page 68
- FuzzyCOOL: Adding Fuzzy Set Theory to CLIPS Object-Oriented Language  
  *V. Cross and A. Firat, Miami University*  
  Page 73
Control - Applications
Chair: H. Siegelmann

Microcontroller-Based Fuzzy Logic System for Autonomous Vehicle
F. Hernandez-Rosales, J. Moreno-Cadenas, L. Flores-Nava, F. Gomez-Castaneda

Fuzzy Process Control of Integrated Circuit Wire Bonding
C. Kinnaird and A. Khotanzad

Experiments in Fuzzy Logic Based Control of a Magnetic Bearing System
S-K. Hong, R. Langari, and D. May

Applying Modular Networks and Fuzzy-Logic Controllers to Nonlinear Flexible Structures
H. Siegelmann, A. Ofri, and H. Guterman

Learning I
Chair: L. Hall

Learning Optimal Fuzzy Rules Using Simulated Annealing
J. Dickerson

Learning Algorithms and Dimensionality
T. Sudkamp and R. J. Hammel II

A Heuristic Criterion Algorithm of the Self-Learning Fuzzy Controller
C. Perng and Y. Chen

A Modified Defuzzifier for Control of the Inverted Pendulum Using Learning
J-S. Wang and R. McLaren

Reinforcement Tuning of Fuzzy Rules
L. Hall and M. Pokory

Modeling
Chair: J. Yen

A Non-Neural Fuzzy Rule Base Approach for Modeling Complex Systems
E. Applebaum

Incremental Fuzzy Modelling of Dependencies in Complex Physical Systems
K. Ouliddren

Decentralized Parameter Estimation with Fuzzy Information
V. N. S. Samarasooriya and P. Varshney

The Incorporation of Qualitative Information into T-S Fuzzy Model
B. Tien and G. Straten

Multiple Fuzzy Systems for Function Approximation
J. Yen, L. Wang, and R. Langari
Object Recognition

Chair: E. Walker

Using Spatial Relationship as Features in Object Recognition
X. Wang, J. Keller, and P. Gader

Character Recognition with Fuzzy Features and Fuzzy Regions
E. Meriooetomo and J. Chen

Fuzzy Variants of Hard Classification Rules for Speech Pattern Recognition in Romanian Language
I. Gavat, O. Grigore, M. Zirra, and O. Cula

Nonlinear Filters for Target Detection in LADAR Range Images
A. Hocaoglu, P. Gader and J. Keller

A Fuzzy Approach to Pose Determination in Object Recognition
E. Walker

Belief, Plausibility, and Probabilities

Chair: G. Klir

Assessing Fuzzy Probabilities Using Neural Networks
M. Jablonowski

The Calculation of Natural Extensions with Respect to Lower Probabilities
Z. Wang and G. Klir

Genetic Algorithms Used for Determining Belief Measures and Plausibility Measures
Z. Wang, K. Leung, and J. Wang

Clustering

Chair: R. Dave

Noise Clustering Algorithm Revisited
R. Dave and Sumit Sen

Implementing the Fuzzy Quadratic Classifier
P. Kersten

Analysis of Concomitant Mechanisms in Stroke Pathogenesis Using Fuzzy Clustering Techniques
J. Dickerson, Y. Daaboul, T. Jobe, and C. Helgason

Clustering Using a Genetic Fuzzy Least Median of Squares Algorithm
O. Nasraoui and R. Krishnapuram
Fuzzy Knowledge and Problem Representation

Chair: W. Pedrycz

Information Granularity Uncertainty Principle: Contingency Tables and Petri Net Representations

W. Pedrycz and J. Peters

A Proposed Structure of Human Knowledge Based on Similarity Transformations

K. Le

Disorder Measures Supporting Autonomous, Imprecise Database Mining

L. Mazlack

Patterns and Symbols for Solving Ill-defined Problems

T. Furuhasi and Y. Hattori

Classification

Chair: J. Keller

Performance Evaluation of Various Variants of Fuzzy Classifier Systems for Pattern Classification Problems

H. Ishibuchi and T. Nakashima

Simple Fuzzy Rule-Based Classification Systems Perform Well on Commonly Used Real-World Data Sets

H. Ishibuchi, T. Nakashima, and T. Morisawa

Fusion of Handwritten Numeral Classifiers Based on Fuzzy and Genetic Algorithms

T. Pham and H. Yan

Determining Fuzzy Integral Densities Using A Genetic Algorithm for Pattern Recognition

D. Wang, X. Wang, and J. Keller

Mathematics

Chair: J. Mordeson

Fuzzy Spheres

S. Cheng and J. Mordeson

L-Prime Spectrum of a Ring

D. Malik and J. Mordeson

Primaries of Infinite Fuzzy Automata

J. Mordeson and P. S. Nair

Finding a Base for a Vector Space of Polynomials

L. McAllister
Fuzzy Relations, Numbers, and Functions
Chair: V. Cross

Fuzzy Relation-preserving Maps and Regular Fuzzy Topological Spaces
J. Barone
286
Total Extension of Set Functions and Relations
M. Wierman
292
Differentiation of Fuzzy Functions
J. Mordeson and M. Wierman
295
Minimal Definitions of Classical and Fuzzy Preference Structures
B. De Baets and B. Van de Walle
299
Compatibility-Based Ranking of Fuzzy Numbers
M. Setnes and V. Cross
305

Fuzzy Applications
Chair: M. Ulieru

Fuzzy Distributed Multi-Agent Manufacturing Systems
R. Aliev and R. Rashad
311
Using Fuzzy Logic for Bounded Recovery of Autonomous Agents
J. Granter, G. Fodor, D. Driankov
317
Soft Computing Issues in the Intelligent Control of Holonic Manufacturing Systems
M. Ulieru
323
Design and Realization of a Two Input Fuzzy Chip Running at a Rate of 80 ns
D. Falchieri, A. Garbrielli, E. Gandolfi, and M. Masetti
329
An Application of Takagi-Sugeno Modelling to an Urban Rainfall-Runoff Relationship
A. Boukhris, S. Giuliani, G. Mourot, and J. Ragot
335

Fuzzy Neural Networks
Chair: C. Isik

Self-Organizing Fuzzy Perceptrons Applied to Power System Stability
A. Afzalian and D. Linkens
341
Application of Fuzzy Neural Networks on Financial Problems
M. Rast
347
Lattice-Valued Logic and Neural Networks
Y. Liu and P. K. C. Wang
350
A Novel Neural Algorithm & Its Application in Solving Fuzzy Relation Equations
X. Li and D. Ruan
356
Recurrent Neuro-Fuzzy Systems
C. Isik and M. Farrokhi
362
Foundation Issues / Fuzzy Reasoning

Chair: T. Whalen

Formulae of Fuzzy Logics
  I. B. Turksen 367
Fuzzy Reasoning with Continuous Piecewise Linear Membership Functions
  P. M. van den Broek 371
Fuzzy Sets Over Evolving Universes
  V. Cutello and R. Yager 377
On a Class of Linear Concurrence Operators
  R. Yager and A. Rybalov 383
Fuzzy Granulation and Modular Tiling: A Useful Duality
  T. Whalen 388

Applications - Measure and Evaluation

Chair: S. Ammar

Applications of Fuzzy Logic to Software Metric Models for Development Effort Estimation
  A. Gray and S. MacDonell 394
Pedagogical Evaluation System Applying Approximate Reasoning
  Y. Okuda and H. Yamashita 400
The Application of Fuzzy Comprehensive Evaluation to Test Program Analysis
  Y. Ma, Y. Sun, and H. Chen 406
A Safety Analysis Method Using Fuzzy Petri Nets
  H. Seong Son and P. Hyun Seong 412
Using Fuzzy Rule Based Economic Models to Measure the Performance of State Funded Agencies
  S. Ammar, R. Wright, J. Leathey, and I. McDonnell 418

Learning II

Chair: R. Holve

Approximate Strategies for Learning Trajectories of Autonomous Learning Agents
  A. Cakmakci and C. Isik 423
Fuzzy System Identification Through Hybrid Genetic Algorithms
  A. Tcholakian, A. Martins, R. Pacheco, R. Barcia 428
Learning by Means of Free Associative Neurons
Diagnosing From Descriptive Knowledge Bases
  D. Filev 440
Rule Generation for Hierarchical Fuzzy Systems
  R. Holve 444