



Congress Schedule

Wednesday January 16th

Congress Schedule

- 08.00 – 17:00 Registration
- 08:00 – 09:00 Coffee will be available
- 09:00 – 10:00 Keynote Speech:
‘Fuzzy Technology in Logistics’
by Prof. Hans- Jürgen Zimmermann
(for details see page 21)
- 10:00 - 10:30 Coffee break
- 10:30 – 11:30 Tutorial:
‘Neuro-fuzzy Systems for Rule Extraction’ (in English)
by Claudio Moraga (for details see page 22)
- 11:30 – 12:30 Tutorial:
‘Early Vision and Soft Computing’
by Vito Di Gesu (for details see page 24)
- 12:30 – 13:30 Lunch
- 13:30 – 14:30 Plenary speech
by Prof. Hans- Heinrich Bothe
(for details see page 25)
- 14:30 – 15:00 Coffee break
- 15:00 – 16:00 Tutorial:
‘Neuro-fuzzy Systems for Rule Extraction’ (in Spanish)
by Claudio Moraga (for details see page 26)
- 16:00 – 17:00 Tutorial:
‘Adaptive Neurofuzzy Modelling , Estimation and Control’
by CJ Harris (for details see page 27)
- 18:30 – 22:00 Opening Ceremony
- 18:30 – 19:00 Transfers from Hotel Plaza and Vedado
- 19:00 – 20:30 Welcome Cocktail
- 21:00 – 21:30 Nine o’Clock Canon Ceremony
- 21:30 – 22:00 Transfers back to hotels

Thursday January 17th

- 09:00 – 11:30 Tutorial:
 'Implementation of Neuro-Fuzzy Algorithms Using Field Programmable Gate Arrays (FPGAs)'
 by Dan Hammerström (for details see page 29)
- 10:00 - 10:30 Coffee will be available
- 11:30 – 13:00 Lunch
- Parallel Technical Sessions
- 13:00 – 14:20 Diagnosis and Scheduling (page 30)
 13:00 – 14:40 Industrial Applications I (page 31)
 13:00 – 14:20 Learning I (page 32)
- 15:00 – 17:00 Tutorial:
 'Introduction to Fuzzy Controllers Design'
 by Jose-Luis Verdegay
 (for details see page 33)
- 15:00 – 15:30 Coffee break
- 15:30 – 16:30 Poster Session Applications (page 34)



Friday January 18th

Congress Schedule

- 09:00 – 10:00 Plenary Speech:
‘Type 2 Fuzzy Sets: Representation and Reasoning’
by I.B. Türksen
(for details see page 36)
- 10:00 - 10:30 Coffee break
- 10:30 – 11:30 Tutorial:
‘Genetic Algorithms’
by Peter Anderson
(for details see page 37)
- 11:30 – 13:00 Lunch
- Parallel Technical Sessions
- 13:00 – 14:40 Data and Image Analysis (page 38)
13:00 – 14:40 Industrial Applications II (page 39)
13:00 – 15:00 Learning II (page 41)
- 15:00 – 15:30 Coffee break
- 15:30 – 16:30 Poster Session Learning Methods (page 42)
- Break
- 20:00 – 24:00 Congress banquet with Cuban show

Saturday January 19th

- 09:00 – 10:00 Tutorial:
'Linear Pixel Shuffling and Its Applications'
by Peter Anderson
(for details see page.43)
- 10:00 - 10:30 Coffee break
- Parallel Technical Sessions
- 10:30 – 11:50 Neural Networks (page 44)
- 10:30 – 12:50 Traffic and Telecommunications Networks (page 45)
- 12:30 – 13:30 Lunch
- 13:30 – 14:30 Closing Ceremony



Detailed Program

Wednesday January 16th

KEYNOTE SPEECH

'Fuzzy Technology in Logistics'

Prof. Hans- Jürgen Zimmermann

Time: 09:00-10:00

Room: YARA

There is no doubt that logistics is an area, that has already been important in the past and will become even more important in the future. The standard (model-) problems in transportation logistics, such as routing, assignment, dispatching etc. are usually combinatorial optimization problems. Therefore, they are considered to be hard to solve (some have been shown to be NP-hard problems). Very often, additional constraints have to be considered in practice, and many of the constraints, cost coefficients and relations are in reality not crisp but fuzzy. Also, decision support systems in logistics are expected to operate online.

Fuzzy sets have been and are being used in different ways to help to solve these problems. For a decade or more, problems of traffic management have been tackled by using fuzzy approaches, and also the use of fuzzy sets in the area of fleet scheduling is well known. Eventually, one of the recent successive developments seems to be the use of approximate reasoning in container transport and storage. In the presentation, the first two areas will be surveyed and visualized by presenting one exemplary application each.

The last area will be discussed in more detail; the problem described is the simultaneous control of 44 cranes, belonging to a facility under construction that will have storage space for 30 000 TEU's (20 foot container). The facility is structured in 22 blocks over which there move the 44 double rail mounted gentry cranes. There will be (on the waterside) 60 AGV's (automatic guided vehicles), 4 quays for very large container ships (altogether 1400 m long) and 14 bridges that unload the ships. On the landside, there will be 6 parallel rail connections and gates for as many trucks arriving simultaneously. In the final stage, it is planned to have 1.9 million containers move through this terminal per year.

The cranes move the containers from and to either the land or the waterside into or from the storage area, and they also do the relocation of containers in the storage area. Sometimes the information available is incomplete. Stochastic modeling, however, would not be appropriate because it would take too much time and the decisions needed have to refer to single containers and not be statistical measures. Therefore, the decision making has been cast into an approximate reasoning knowledge based system, in which the knowledge is stored in the form of (fuzzy) if-then statements and the inference engine is a multi-stage meaning preserving engine, in which degrees of compensation between the different conditions are modeled by using various fuzzy operators.



Wednesday January 16th

Detailed Program

TUTORIAL

'Neuro-fuzzy Systems for Rule Extraction' (in English)

Claudio Moraga

Time: 10:30 – 11:30

Room: YARA

NOTE: This tutorial will be given in English and in Spanish; English this morning and Spanish in the afternoon.

The aim of the Tutorial is to give a two hours overview of the most relevant aspects in the area of fuzzy rule extraction supported by neural networks. Attendees to the Tutorial are expected to have a basic knowledge of feedforward neural networks and approximate reasoning in the frame of fuzzy logic. (If requested, the tutorial may be extended (to a total of 4 hours) to include these introductory aspects).

INTRODUCTION

The tutorial will discuss first the “when” and “why” of data-driven modeling and introduce some of the classical approaches, like the Wang-Mendel algorithm [WaM 92] or statistical regression. Following this, the motivation for the neuro-fuzzy approach will be given [TMB 99].

Core: (The “how” of data-driven modeling)

The discussion of neuro-fuzzy rule extraction begins with an analysis of the ANFIS-System [Jan 92], [Jan 93], [JaS 95], [Jan 97] and of ANFIS-like systems (e.g. [GBB 92], [KTT 92], [YiO 92], [MoH 96]) including the case of using triangular fuzzy sets to represent the linguistic terms of the premises [God 97]. Positive aspects and constraints for the rule extraction with ANFIS will be discussed. Possibilities of alleviating constraints by clustering or by an evolutionary design [MeM 96], [MFS 99] of the front end of ANFIS will be considered. Special emphasis will be drawn upon the interpretability of the obtained rules [ADT 97], [Rot 99]. ANFIS architectures with direct crisp outputs (Takagi-Sugeno, Tsukamoto) and fuzzy outputs (including possibly a defuzzification module) will be shown [Bra 93].

The second important approach to neuro-fuzzy rule extraction is based on the NARA-System [TaH 91], [TSK 92] and NARA-like systems [HaM 96]. A comparative analysis will be done between NARA and ANFIS as well as between NARA and neuro-fuzzy systems based on RFB-networks [JaS 93] [BeB 97]. Refinements of NARA leading to splitting or chaining of rules will be presented [MoH 96]. A discussion on the interpretability of the extracted rules will close this chapter [Cra 96].

ANFIS and all ANFIS-like systems extract fuzzy if-then rules such that the premises are connected by a t-norm [Men 42], [ScS 83], [Web 83]. The t-norm being used is the product, because it is continuous and all over differentiable. It will be shown with simple examples, that there are real world problems that cannot conveniently be modelled by using t-norms to connect the premises [Mor 00a], [MoT 01]. Compensating operators are required [Dom 82], [DuP 85], [KMP 96]. It will be shown that fuzzy if-then rules using the compensating operator symmetric sum [Sil 79] may be extracted by using feedforward neural networks with one hidden layer using the standard logistic activation function [Ben 98], [BCR 97]. It will further be shown that there is a whole class of S-shaped activation forms supporting a similar transformation [THM 99], [MoT 01]. Furthermore it will be shown [Mor 00b], [Mor 01] how to modify an ANFIS system to extract rules using the additive Gamma operator [ZiZ 80], [ZiZ 83] as well as weighted connectives [Dub 83], which are compensating operators.

The Tutorial will close with a discussion on achievements, limits and trends.



Wednesday January 16th

Detailed Program

TUTORIAL

'Early Vision and Soft Computing'

Vito Di Gesù

Time: 11:30-12:30

Room: YARA

BIOGRAPHY

Vito Di Gesù was born in Turin (Italy) in 1945. He is graduated in physics from Palermo University. He has been visiting professors in several universities and research Laboratories, among them UC-Berkeley (USA), Stanford University (USA), Cambridge (UK), Tel Aviv University (Israel), ISI (Calcutta, India), ICSI Berkeley, EPRI (Palo Alto, USA), IBM Research Institute (Palo Alto, USA). He received international acknowledges for his scientific work: I.A.P.R.-Italian Chapter prize, for scientific and organizing activities in image processing and computer vision (1993); Mahalanobis prize, for scientific activities in pattern recognition (1994); IAPR fellow nomination for researches in pattern recognition and machine vision (1994). His research cover image analysis and processing, machine vision and soft visual systems with applications to astronomy, biology and remote sensing imaging. He is editor of books on data analysis, image processing and artificial perception. At the present he is full professor at the Palermo University and head of the computer vision group at the Department of Applied Mathematics.

INTRODUCTION

The term "soft-computing" has been introduced by Zadeh in 1994. Soft-computing provides an appropriate paradigm to program malleable and smooth concepts. For example, it can be used to introduce flexibility in artificial systems improving their Intelligent Quotient. The good performance of this approach is claimed by the fact that digital images are examples of fuzzy entities, where geometry of shapes are not always describable by exact equations and their approximation can be very complex. Aim of this paper is to describe methods and applications of soft-computing to early vision problems. The following topics will be covered:
early vision (fuzzy morphology and soft digital geometry)
applications to: robotics navigation and vision, face analysis, NMR, segmentation



Wednesday January 16th

PLENARY SPEECH

Hans- Heinrich Bothe

Time: 13:30–14:30

Room: YARA

No information available.



Wednesday January 16th

Detailed Program

TUTORIAL

'Neuro-fuzzy Systems for Rule Extraction' (in English)

Claudio Moraga

Time: 15:00 – 16:00

Room: YARA

NOTE: This tutorial will be given in English and in Spanish; English this morning and Spanish in the afternoon.

For details see page 22.

Wednesday January 16th

TUTORIAL

'Adaptive Neurofuzzy Modelling , Estimation and Control'

CJ Harris

Time: 16:00 – 17:00

Room: YARA

BIOGRAPHY

Prof CJ Harris, currently Head of the Department of Electronics and Computer Science, University of Southampton, UK. Author of over 200 papers since 1987 on Computational Intelligence. Recent research books include 'Neurofuzzy Adaptive Modelling & Control' (Prentice Hall, 1994), 'Adaptive Neural Network Control of Robotic Manipulators' (World Scientific Press, 1998). Best journal paper awards Royal Aero Soc (1997, 1998), I.MechE (1999), IEE (2001) for Neurofuzzy Modelling papers. Elected to Royal Academy of Engineering 1996, awarded the IEE Senior Achievement Medal 1998 and the 2001 Faraday Medal for 'International acclaim in Intelligent Control and Neurofuzzy Modelling'.

ABSTRACT

This Advanced Tutorial on Neurofuzzy Systems lasts about 2 hours plus about an hour for questions ,and is aimed at real time nonlinear dynamic modelling, control and estimation problems for academics, industrialists and commercial workers interested in this technology . It is a PowerPoint presentation with several video inserts covering applications and demonstrations. It is an extended version of the IEE 2000 Tustin Lecture.

Data Based Modelling and Control (design of experiments/data gathering, preprocessing, model estimation and construction of models, model validation, interpretation and transparency).

Data Based Modelling Requirements (accuracy, generalisation, provable learning, prior information, robustness)

Modelling Approaches - supervised vv unsupervised

Neurofuzzy Modelling Architectures

Network Learning Laws (LMS/NLMS)

Limitations of Neurofuzzy Algorithms (analysis of variance, ASMOD, ANFIS, LOLIMIO, -)

Network Regularisations

Local Neurofuzzy Modelling Techniques (k-d trees, quad trees, Delaunay partitioning, multiresolution, mixture of experts)

Neurofuzzy Linearisation Techniques

Neurofuzzy Control

Neurofuzzy State Estimation (recurrent, local linearisation and feedback linearisation)

Applications of Neurofuzzy Algorithms (car parking, car collision avoidance, ship traffic control, engine torque control, idle speed control, ship tracking, helicopter collision avoidance - all video's of real applications).



FUTURE RESEARCH

Books for reference by attendees ,an addition reading list of current research papers SSwill be provided

CJ Harris ,X Hong, Q Gan "Adaptive Modeling, Estimation and Fusion from Data" to be published by Springer 2001.

M.Brown , CJ Harris " Neurofuzzy Adaptive Modeling and Control " Prentice Hall 1994.

SS Ge ,TH Lee, CJ Harris. " Adaptive Neural Network Control of Robotic Manipulators " World Scientific Press 1998

Thursday January 17th

TUTORIAL

'Implementation of Neuro-Fuzzy Algorithms Using Field Programmable Gate Arrays (FPGAs)'

Dan Hammerström

Time: 09:00 – 11:30

Room: YARA

INTRODUCTION

FPGAs (Field Programmable Gate Arrays) have achieved significant computation density in the last few years. A single, state of the art device can emulate several million gates at frequencies of several hundred MHz. In addition, design tools are sufficiently powerful to allow the automatic synthesis of large, complex designs. And, FPGA manufacturers are beginning to focus on the signal processing market by adding special functionality and tools to allow for efficient execution of algorithms.

Many researchers are beginning to perceive FPGAs as an alternative implementation medium for neural network and fuzzy logic algorithms. The natural parallelism of these algorithms makes them ideal candidates for FPGA implementation. Because of their programmability individual functions in an FPGA tend to be slower than full custom implementations, but unlike processors, they are configurable at the gate level and can significantly leverage parallelism if it is available in the target algorithm.

This tutorial will cover the basics of FPGA designs as well as the process used to map algorithms to FPGAs. In addition, the current state of the art of FPGAs and FPGA boards and development platforms will be reviewed. There is not enough time to provide complete instruction on the implementation process, but the attendees of the tutorial should come away with a realistic assessment of whether FPGAs would be useful in their research programs and what is required in terms of CAD tools and expertise.

This tutorial is targeted at researchers who are considering hardware implementations for research and or applications.



Thursday January 17th

Detailed Program

Diagnosis and Scheduling

Time: 13:00 – 14:20

Room: YIMAGUAYU

Chair: Hans H. Bothe

13:00 - 13:20

#100027-01-AA-013

'Neuro-Fuzzy Regulator with Gain Scheduling'

Dr Alberto Aguado Behar, ICIMAF, Cuba

Ana Celia Campos Hernández, ICIMAF, Cuba

Alfredo Gómez Infante, ICIMAF, Cuba

13:20 - 13:40

#100027-01-GG-083

'Automating the Generation of Neural-Network Diagnosis Systems for Electric Linear Circuits'

Prof Miguel García, University of Michoacana, Mexico

Juan J Flores, University of Michoacana, Mexico

13:40 - 14:00

#100027-01-AD-111

'The Introduction of Neural and Fuzzy Systems in University Curricula of Systems and Control'

Prof Dr António Dourado Correia, University of Coimbra, Portugal

Jorge Oliveira Henriques, University of Coimbra, Portugal

14:00 - 14:20

#100027-01-AO-137

'Solving Problems with Integer Representation Using a Tree Based Factorized Distribution Algorithm.'

Dr Alberto Ochoa, ICIMAF, Cuba

Roberto Santana, GMD, Germany

Marta R. Soto, ICIMAF, Cuba

Thursday January 17th

Industrial Applications I

Time: 13:00 – 15:00

Room: YARA

Chair: Orestes Llanes

13:00 - 13:20

#100027-01-CS-020

'Weaning from Artificial Ventilation Using a Fuzzy Knowledge-Based Control System'

Prof Christian Schuh, University of Vienna Medical School, Austria

K.P. Adlassnig, University of Vienna Medical School, Austria

M. Hiesmayr, University of Vienna Medical School, Austria

13:20 - 13:40

#100027-01-DM-022

'On Studying a Non-Standard Genetic Algorithm Solving Inverse Problems from Chemical Kinetics'

Dr Dagmar Monett Diaz, Humboldt University Berlin, Germany

Hans-Dieter Burkhard, Humboldt University Berlin, Germany

13:40 - 14:00

#100027-01-DP-024

'An Objective Procedure for Bounding the Number of Components in Mixture Models'

Prof Derek Partridge, University of Exeter, United Kingdom

Shuang Cang, University of Exeter, United Kingdom

14:00 - 14:20

#100027-01-FH-029

'Fuzzy Identification of a Biotechnological Process'

Dr Francisco Herrera Fernández, Central University of Las Villas, Cuba

Isaac Amoako, Central University of Las Villas, Cuba

14:20-14:40

#100027-01-ZZ-040

'A New Method for Tool Condition Monitoring in Face Milling'

Dr Zhen Zhang, National University of Singapore, Singapore

G.S. Hong, National University of Singapore, Singapore

Y.S. Wong, National University of Singapore, Singapore



Thursday January 17th

Learning I

Learning I

Time: 13:00 – 14:20

Room: BARAGUA

Chair: Claudio Moraga

13:00 - 13:20

#100027-01-XH-008

'A Parallel Recursive Least Squares On-Line Learning Algorithm'

Dr Xia Hong, University of Southampton, United Kingdom

C.J. Harris, University of Southampton, United Kingdom

13:20 - 13:40

#100027-01-AF-016

'Fuzzy Rule Extraction by a KBN Approach'

Prof Anna Maria Fanelli, University of Bari, Italy

G. Castellano, University of Bari, Italy

T. Roselli, University of Bari, Italy

13:40 - 14:00

#100027-01-GD-025

'Genetic Programming for the Generation of Crisp and Fuzzy Rule Bases in Classification and Diagnosis of Medical Data'

Dr George Dounias, University of the Aegean, Greece

Hubertus Axer, RWTH Aachen, Germany

Beth Bjerregaard, Herlev University Hospital, Denmark

Diedrich Graf von Keyserlingk, RWTH Aachen, Germany

Jan Jantzen, Technical University of Denmark, Denmark

Athanasios Tsakonas, University of the Aegean, Greece

14:00 - 14:20

#100027-01-ZK-046

'Extended Issues of PGAS Based on One Population'

Dr Jiri Lazansky, Czech Technical University, Czech Republic

Mr Zdenek Konfrst, Czech Technical University, Czech Republic

Thursday January 17th

TUTORIAL

'Introduction to Fuzzy Controllers Design'

Jose-Luis Verdegay

Time: 15:00-17:00

At the ISPJAE Institute. Information on transfers is available at the Registration Office on the information board.

ABSTRACT

We are proud to present this tutorial as a related event to the NF 2002.

It will be held at the ISPJAE Institute and is free for all interested, not only participants of the conference.

It will be held in Spanish.

Please note that although no fees are required for this tutorial, attendance to the NF 2002 conference, which is held at the 'Capitolio' congress centre, requires a registration always.

The main aim of this Tutorial is introducing the foundations of Fuzzy Controllers Design in order to promote and disseminate the knowledge on these approaches and techniques among the young cuban professionals and students. From this point of view, and in agreemet with NF'2002 organizers, the tutorial will be addressed in spanish language and people from ISPJAE will introduce some special topics on hardware developments. The tutorial lasts about 2.5 hours plus half one hour approximately for questions on current worldwide practical realisations and possible developments in Cuba of the Fuzzy Controllers. Along the first 2.5 hours, the following topics will be covered:

- Fuzzy Sets and Systems History.
- Modeling of Uncertainty. Probability, uncertainty and fuzziness.
- Foundations of Fuzzy Sets and Systems: Membership, operations and arithmetics.
- Fuzzy Logic based Systems: linguistic variables, fuzzy rules, inferences, defuzzification.
- Fuzzy Logic Controllers: Types, functioning and implementations.
- Hardware for different fuzzy logic elements.
- Hardware implementation of fuzzy controllers.
- Examples
- Future developmments in Cuba

As the tutorial is self-contained, the attendees will not need any previous background.



Thursday January 17th

Poster Session Applications

Poster Session Applications

Time: 15:30 – 16:30

Room: BAIRE

At the beginning of the session all poster presenters have a two- minute opportunity to introduce their paper.

#100027-01-FL-003

'Study of Nutrient Pollution in the Chesapeake Bay'

Dr Frank C. Lin, University of Maryland Eastern Shore, USA

Manal Salamabi, University of Maryland Eastern Shore, USA

#100027-01-AC-041

'Development of Level Controllers Based on Fuzzy Logic'

Prof Alejandro Cabrera, Centro Nacional de Microelectronica, Spain

Angel Barriga, Centro Nacional de Microelectrónica, Spain

Carlos Jimenez, Centro Nacional de Microelectrónica, Spain

Orestes Llanes, Instituto Superior Politécnico Jose A. Echeverría, Cuba

Santiago Sanchez-Solano, Centro Nacional de Microelectronica, Spain

Raouf Senhadji, Centro Nacional de Microelectrónica, Spain

#100027-01-SC-051

'On Line Rejection of Movement Artifacts Using Neural Networks'

Dr Sylvie Charbonnier, LAG, France

Christian Jutten, LIS, France

Jean Philippe Siché, CHU Grenoble, France

#100027-01-AF-101

'A Neuro-Fuzzy Control System for Traffic Lights'

Prof Dr Ademar Ferreira, University of Sao Paulo, Brazil

Leoncio Gamarra, University of Sao Paulo, Brazil

#100027-01-AS-105

'Power Network Control Using Neuro-Fuzzy Term-Rewriting'

Dr Adam Steele, DePaul University CTI, USA

Ashley Morris, DePaul University CTI, USA

#100027-01-JS-118

'Flexible Land Classification for Olive Cultivation using User Knowledge'

Mr Jose M Serrano, University of Granada, Spain

Victor Aranda, University of Granada, Spain

Julio Calero, University of Granada, Spain

Gabriel Delgado, University of Granada, Spain

Daniel Sanchez, University of Granada, Spain

M. Amparo Vila, University of Granada, Spain

#100027-01-RW-120

'Improved Traffic State Identification using Dynamic Data Mining'

Dr Richard Weber, University of Chili, Chile

Fernando Crespo, University of Chili, Chile

#100027-01-JM-146

'Forecasting Returns of Scrapped Products Using a Hybrid Approach'

Jorge Marx-Gómez, Otto-von-Guericke-University Magdeburg, Germany

Claus Rautenstrauch, Otto-von-Guericke-University Magdeburg, Germany

#100027-01-CG-148

'A Neuro-Fuzzy Architecture for Background - Foreground Video Segmentation'

Cataldo Guaragnella, Politecnico di Bari, Italy

Giuseppe Acciani, Politecnico di Bari, Italy

Ernesto Chiarantoni, Politecnico di Bari, Italy

Vito Santacesaria, Bari Industry Association, Italy



Friday January 18th

Poster Session Applications

PLENARY SPEECH

'Type 2 Fuzzy Sets: Representation and Reasoning'

I.B. Türksen

Time: 09:00 – 10:00

Room: YARA

ABSTRACT

Interval-valued Type 2 fuzziness exists and provides a richer knowledge representation and approximate reasoning for computing with words. First, it has been shown that membership values reveal a scatter plot and thus represents a varying degrees of meaning for words. This is realized whether they are acquired subjectively in measurement experiments or they are captured by fuzzy clustering methods. Secondly, it has been shown that the combination of linguistic values with linguistic operators, such as, "AND", "OR", "IMP", etc., as opposed to t-norms and co-norms, and standard negation, generates Fuzzy Disjunctive and Conjunctive Canonical Forms, FDCF and FCCF, respectively. Recently, we have shown that there is a natural connection between Dempster's multi-valued mapping and interval-valued Type 2 fuzzy sets. In particular, it is shown that FDCF and FCCF corresponds to lower and upper set approximations obtained by a newly proposed Dempster-Türksen formalism.

Friday January 18th

TUTORIAL

'Genetic Algorithms'

Peter Anderson

Time: 10:30 – 11:30

Room: YARA

BIOGRAPHY

Professor Peter G. Anderson has been the chairman of RIT's graduate computer science program since 1980. Prior to joining RIT, he worked for RCA's computer division and was a faculty member at Princeton, New Jersey Institute of Technology, and Seton Hall.

He has had consulting relationships with several companies.

His B.S. and Ph.D. are in Mathematics from MIT, in 1962 and 1964; his dissertation was in Algebraic Topology, culminating a life long interest in Klein bottles.

His current research interests are in the areas of neural network and their applications to image processing, genetic (and related) algorithms image processing and computer graphics, number theory (Fibonacci numbers), computing aspects of mathematics, and mathematical aspects of computing.

In his spare time, he studies Chinese, swims, and trains his dogs.

ABSTRACT

A genetic algorithm (GA) is an indirect method for rapidly searching for good solutions for hard problems. The problems that GAs are particularly suited for are those that have no straight-forward algorithmic solution-generators but do have methods for evaluating how good a proposed solution is. Such problems are typified by scheduling and lens design.

GAs are patterned on nature's evolution ("survival of the fittest") or selective breeding. A GA maintains a large population of trial solutions to the problem, selects some with higher fitness, and recombines their components to form new solutions. Over time, the population contains more and more solutions with higher and higher fitness.

This is a short, elementary course to introduce GAs to participants with a computer programming background. GA programs, tools, and applications will be provided.



Friday January 18th

Data and Image Analysis

Data and Image Analysis

Time: 13:00 – 14:40
Room: YIMAGUAYU
Chair: Peter Anderson

13:00 - 13:20

#100027-01-PB-088

'A Visual Segmentation Algorithm Applied to Quantum Dots'

Dr Paolo Belardinelli, ECONA-University of Rome "La Sapienza", Italy
Brunello Tirozzi, ECONA, University of Rome, Italy

13:20 - 13:40

#100027-01-RF-110

'An Approach for Combining Numerical and Linguistic Information about Variables used in Self-Organizing ANNs based on the 2-tuple Fuzzy Linguistic Representation Model'

Prof Raquel Flórez-López, University of León, Spain

13:40 - 14:00

#100027-01-LE-114

'Tree-Structured Multi-Resolution Clustering Network for Function Approximation'

Mr. Lars Eriksson, Lund University, Sweden
Christian Balkenius, Lund University, Sweden
Thomas Laurell, Lund University, Sweden
Fredrik Sebelius, Lund University, Sweden

14:00 - 14:20

#100027-01-GK-139

'Associated Images In Multidimensional Data Sets'

Dr Gerald Krell, Otto-von-Guericke-Universität Magdeburg, Germany
Bernd Michaelis, Otto-von-Guericke-Universität Magdeburg, Germany
Nils Riefenstahl, Otto-von-Guericke-Universität Magdeburg, Germany

14:00 - 14:20

#100027-01-TA-153

'Using the Fuzzy Logical Model of Perception in Measuring Intergration of Audiovisual Speech in humans'

Tobias S. Andersen, Helsinki University of Technology, Finland
Kaisa Tiippana, Helsinki University of Technology, Finland
Mikko Sams, Helsinki University of Technology, Finland

Friday January 18th

Industrial Applications II

Time: 13:00 – 14:40

Room: YARA

Chair: Derek Patridge

13:00 - 13:20

#100027-01-RE-027

'Fuzzy Indexes for Bargaining'

Dr Rafael A. Espin- Andrade, ISPJAE, Cuba

Eduardo Fernández- González, Universidad Autónoma de Sinaloa, Mexico

Gustavo Mazcorro- Tellez, UPIICSA-IPN, Mexico

13:20 - 13:40

#100027-01-GG-054

'Leak Monitoring for Pipelines Based on Neural Networks'

Prof Dr Gerhard Geiger, University of Applied Sciences Gelsenkirchen, Germany

Thomas Werner, University of Applied Sciences Gelsenkirchen, Germany

Drago Matko, University of Ljubljana, Slovenia

13:40 -14:00

#100027-01-RH-058

'A Hierarchical Fuzzy Control System. Application to Machine-Tool Process Optimization'

Dr Rodolfo Haber, University of Oriente, Cuba

A. Alique, Instituto de Automatica Industrial, Spain

R.E. Haber, Universidad Autonoma de Madrid, Spain

C.R. Peres, Instituto de Automatica Industrial, Spain

S. Ros, Institiuto de Automatica Industrial, Spain



14:00 - 14:20

#100027-01-MR-125

**'A MIMO Fuzzy Controller:
A Nickel Reduction Furnace Application'**

Prof Mercedes Ramírez Mendoza, University of Oriente, Cuba

Rodolfo Haber, University of Oriente, Cuba

14:20 - 14:40

#100027-01-FS-142

'Fast Analog Neuro-Chip with Learning On-Chip'

Frank Stüpmann, Neurosystems GmbH, Germany

G. Geske, Neurosystems GmbH, Germany

S. Rode, Neurosystems GmbH, Germany

N. Schmidt, Neurosystems GmbH, Germany

Friday January 18th

Learning II

Time: 13:00 – 15:00

Room: BARAGUA

Chair: CJ Harris

13:00 - 13:20

#100027-01-BF-047

'Similarity Measures, Ranking Functions and Perceptrons'

Prof Dr Bernd-Juergen Falkowski, University of Applied Sciences Stralsund, Germany

13:20 - 13:40

#100027-01-FL-072

'Direct Optimization of Simple Cost Functions of the Margin'

Dr Fernando E. Lozano, University Javeriana, Colombia

Vladimir Koltchinskii, University of New Mexico, USA

13:40 - 14:00

#100027-01-AC-073

'Hybrid Schemes for Parameter Tuning of Nonlinear Dynamical Systems'

Mrs Angela Castillo, Universidad Politecnica de Madrid, Spain

Pedro Zufiria, Universidad Politecnica de Madrid, Spain

14:00 - 14:20

#100027-01-HS-090

'Automatic Generation of Fuzzy Logic Rule Bases: Examples I'

Dr Hartmut Surmann, GMD-AiS, Germany

Alexander Selenschtschikow, GMD-AiS, Germany

14:20 - 14:40

#100027-01-CK-144

'Model Selection in Fuzzy Regression Analysis'

Chiang Kao, National Cheng Kung University, Taiwan

Chin Lu- Chyu, National Cheng Kung University, Taiwan

14:40 - 15:00

#100027-01-AM-150

'An Evolutionary Transpositional Solution for a Class of Permutation- Based Problems'

Arvind Mohais, University of the West- Indies, Trinidad & Tobago

Christian Posthoff, University of the West- Indies, Trinidad & Tobago



Friday January 18th

Poster Session Learning Methods

Poster Session Learning Methods

Time: 15:30 – 16:30

Room: BAIRE

#100027-01-HL-004

'Assessing Hydro Power System Relevant Variables: a Comparison Between a Neural Network and Different Machine Learning Approaches'

Prof Hakim Lounis, University of Québec, Montréal - UQAM, Canada

Mounir Boukadoum, University of Québec, Montréal - UQAM, Canada

Vincent Siveton, Centre de Recherche Informatique de Montreal, Canada

#100027-01-FB-030

'Adaptive E-Business Agents Based on Neural Networks'

Prof Dr Freimut Bodendorf, University of Erlangen-Nuremberg, Germany

Oliver Hofmann, University of Erlangen-Nuremberg, Germany

#100027-01-WF-033

'Using Genetic Algorithms for Delay Minimization in the FPGAs Routing'

Dr Wilfredo Falcon Urquiaga, University of Pinar del Rio, Cuba

Jon Altuna, University of Mondragon, Spain

Jose Luis Flores, University of Mondragon, Spain

Jose Raul Vento Alvarez, University of Pinar del Rio, Cuba

#100027-01-WL-035

'MFOS - Muenster's Fuzzy Rules Optimisation System'

Dr Wolfram M. Lippe, Westf. Wilhelms-University, Germany

#100027-01-BB-087

'Approximate Solution of an Extended 0/1 Knapsack Problem Using GRASP'

Prof Dr Gulnara Baldoquín de la Peña

#100027-01-MY-145

'Identification of Impulse Response of the Vocal Tract for Consonants by Using the Genetic Algorithm'

Masahide Yoneyama, Tokyo University, Japan

Mitsumune Toujo, Tokyo University, Japan

Hiroshi Sakai, Tokyo University, Japan

Hiroto Saito, Tokyo Denki University, Japan

Shogo Nakamura, Tokyo Denki University, Japan

Saturday January 19th

TUTORIAL

'Linear Pixel Shuffling and Its Applications'

Peter Anderson

Time: 09:00 – 10:00

Room: YARA

BIOGRAPHY

Professor Peter G. Anderson has been the chairman of RIT's graduate computer science program since 1980. Prior to joining RIT, he worked for RCA's computer division and was a faculty member at Princeton, New Jersey Institute of Technology, and Seton Hall.

He has had consulting relationships with several companies.

His B.S. and Ph.D. are in Mathematics from MIT, in 1962 and 1964; his dissertation was in Algebraic Topology, culminating a life long interest in Klein bottles.

His current research interests are in the areas of neural network and their applications to image processing, genetic (and related) algorithms image processing and computer graphics, number theory (Fibonacci numbers), computing aspects of mathematics, and mathematical aspects of computing.

In his spare time, he studies Chinese, swims, and trains his dogs.

INTRODUCTION

Linear pixel shuffling (LPS) is a method of ordering pixels (the elements of a rectangular matrix or analogies in higher dimensions) based on an arithmetic progression with wrap-around (modular arithmetic). For appropriate choices of the progression's Fibonacci numbers and the golden mean, we parameters based on generalizations of achieve uniformly distributed collections of pixels formed by intervals of the pixel progression or 'shuffle'.

We illustrate LPS with a novel approach to progressive rendering of synthetic images, and we note several opportunities for applications to other areas of image processing. LPS, in an infinite analog, provides an unlimited, uniform sampling of points in the unit cube (of any dimension), which is useful for Monte Carlo integration and the placement of feature centers for neural networks.

This talk will present the basic ideas of LPS and show how it can be applied to computer graphics (progressive rendering), image processing (halftoning), and neural networks (radial basis function centering and feed forward net weight setting).



Saturday January 19th

Neural Networks

Neural Networks

Time: 10:30 – 11:50

Room: YARA

Chair: Hans-Jürgen Zimmermann

10:30 - 10:50

#100027-01-AA-014

'A Neural PID Regulator'

Dr Alberto Aguado Behar, ICIMAF, Cuba

Ana Celia Campos Hernández, ICIMAF, Cuba

Alfredo Gómez Infante, ICIMAF, Cuba

10:50 - 11:10

#100027-01-JZ-037

'A Hybrid Method for Training a Feedback Neural Network'

Dr Jesús M. Zamarreño, University of Valladolid, Spain

Pedro A. González, ICIMAF, Spain

11:10 - 11:30

#100027-01-PZ-071

'Radial Basis Function Training for Nonlinear Regression with Censored Data'

Prof Dr Pedro J. Zufiria, Universidad Politecnica de Madrid, Spain

Angela Castillo, Universidad Politecnica de Madrid, Spain

Carlos Rivero, Universidad Complutense de Madrid, Spain

11:30 - 11:50

#100027-01-BM-096

'Credit Card Fraud Detection Using Bayesian and Neural Networks'

Prof Dr Bernard Manderick, Free University Belgium, Belgium

Sam Maes, Free University Belgium, Belgium

Karl Tuyls, Free University Belgium, Belgium

Bram Vanschoenwinkel, Free University Belgium, Belgium

Saturday January 19th

Traffic and Telecommunications Networks

Time: 10:30 – 11:50

Room: BARAGUA

Chair: Alberto Ochoa

10:30 - 10:50

#100027-01-AA-017

'A Neuro-Fuzzy Congestion Controller in a Prioritised ATM Switch'

Dr Arif Al-Hammadi, Etisalat College of Engineering, UAE

John Schormans, Queen Mary and Westfield College, United Kingdom

10:50 - 11:10

#100027-01-IB-032

'Why Robots Should Use Fuzzy Mathematical Morphology'

Dr Isabelle Bloch, Ecole Nat. Sup. des Telecommunications, France

Alessandro Saffiotti, Orebro University, Sweden

11:10 - 11:30

#100027-01-FS-113

'Tele-Operation of Multi-Finger Virtual/Robot Hand Using Self-Organizing Tree Structured Network on EMG'

Mr Fredrik Sebelius, Lund University, Sweden

Christian Balkenius, Lund University, Sweden

Lars Eriksson, Lund Institute of Technology, Sweden

Thomas Laurell, Lund Institute of Technology, Sweden

11:30 - 11:50

#100027-01-HH-152

'Model Predictive Control for Optimal Coordination of Ramp Metering and Variable Speed Control'

Hans Hellendoorn, Delft University of Technology, The Netherlands

Bart Schutter, de, Delft University of Technology, The Netherlands

Andreas Heyyi, Delft University of Technology, The Netherlands