August 29-31, 2006
Genova, Italy

The 7th International FLINS Conference
on Applied Artificial Intelligence Systems for Applied Research

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FLINS 2006 – General Information

About FLINS

The Belgian Nuclear Research Centre (SCK•CEN) and Ghent University (UGent) are organizing

the 7th International FLINS Conference on Applied Artificial Intelligence

FLINS, an acronym for Fuzzy Logic and Intelligent technologies in Nuclear Science, is a well-established international research forum to advance the theory and applications of computational intelligence for applied research in general and for nuclear science and engineering in particular.

FLINS 2006 is the seventh in a series of conferences on computational intelligence for applied research and follows the successful FLINS 1994 in Mol, FLINS 1996 in Mol, FLINS 1998 in Antwerp, FLINS 2000 in Bruges, FLINS 2002 in Ghent, and FLINS 2004 in Blankenberghe (Belgium). **FLINS 2006** aims at covering state-of-the-art research and development in computational intelligence for applied research and in particular for nuclear science and engineering. The principal missions of **FLINS** are:

• conducting research on applied AI systems for solving intricate problems pertaining to nuclear/power research and related complex systems

• bridging the gap between machine intelligence and complex systems via joint research with Belgian, European, and international research institutes and universities

• encouraging interdisciplinary research and bringing multi-discipline researchers together via the international FLINS conferences on Applied AI.

Conference Organization and Supporters

Honorary Chairs: Lotfi Zadeh and Hans Zimmermann

General chair: Da Ruan

Program co-chairs: Pierre D'hondt and Etienne E. Kerre

Local organizing chair: Paolo Fantoni

Program Managers: Martine De Cock and Mike Nachtegael

Organizing Committee Member: Dietrich Van der Weken

International Scientific Program Committee:

J. Benitez (Mexico), Z. Bien (Korea), O. Castillo (Mexico), G. Chen (China), C. Cornelis (Belgium), R. de Moraes (Brazil), Y.S. Ding (China), D. Dubois (France), X.Z. Gao (Finland),

E. Gregoire (France), P. Guo (Japan), M.M. Gupta (Canada), W. Halang, (Germany), R. Hampel (Germany), A.E. Hassanien (Kuwait), F. Herrera (Spain), E. Herrera-Viedma (Spain), J.W. Hines (USA), Z.-G. Hou (China), C. Huang (China), J. Kacprzyk (Poland), C. Kahraman (Turkey), N. Kasabov (New Zealand), G.J. Klir (USA), L. Kóczy (Hungary), T. Li (China), Z. Li (Germany), J. Liu (UK), J. Lu (Australia), L. Maguire (United Kingdom), D. Maravall (Spain), L. Martínez (Spain), J. Montero (Spain), B.S. Moon (Korea), H. Nobuhara (Japan), V. Novak (Czech Republic), M. Oussalah (UK), C.M.N.A.Pereira (Brazil), T. Onisawa (Japan), I. Perfilieva (Czech Republic), H. Prade (France), G. Resconi (Italy), D. Roverso (Norway), P. Smets (Belgium), A. Tocatlidou (Greece), A. Thunem (Norway), B. Upadhya (USA), R.E. Uhrig (USA), A.J. van der Wal (The Netherlands), D. Van der Weken (Belgium), J. Vandewalle (Belgium), P.P. Wang (USA), R.R. Yager (USA), J.B. Yang (UK), Y. Xu (China), L.A. Zadeh (USA), X. Zeng (France), H.-J. Zimmermann (Germany), G. Zhang (Australia), J. Zhang (Germany), C. Zhou (Singapore), E. Zio (Italy)

FLINS 2006 is organized with the support of:

REGIONE LIGURIA

Provincia di Genova

COMUNE DI GENOVA

Convention Bureau Genova

Institutt for energiteknikk

softeco sismat
information technology

hp
invent

Conference Venue

For the first time in the **FLINS**-history, **FLINS 2006** will be held outside of Belgium. The conference will take place in the beautiful city of Genova in Italy (indeed, the European Cultural Capital of Culture 2004). The *President Star Hotel*, with excellent conference facilities, will serve as the conference venue.

President Star Hotel
Corte Lambruschini, 4
16129 Genova
Italia
Tel. +39 010 5727
Fax +39 010 5531820
E-mail: president.ge@starhotels.it

Social Activities

A welcome reception (in the conference hotel) is offered on Tuesday, August 29, from 18h00 to 19h00.

The conference dinner takes place on Wednesday, August 30, at 19h30 in the *Madama Doré Villa Il Palazzo*. The professionalism, elegance and courtesy, and the special care in the choice of first quality ingredients are Madama Doré's guarantees to make every event a winner. Conference participants will be transferred by bus, and will get a free guided tour at this historical landmark of the city of Genova.

FLINS 2006 Proceedings

FLINS 2006 Proceedings, published as the book *Applied Computational Intelligence* (World Scientific, Singapore), will be available at the conference. Additional copies of the proceedings can be ordered at **FLINS 2006**.

Correspondence and further information

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FLINS 2006 – PROGRAM

General notice

The **FLINS 2006** Conference consists of plenary and parallel sessions.

All plenary sessions, including the Opening Session, take place in the *Sala Colombo.*

The first of each two Parallel Sessions takes place in the *Sala Colombo*; the second of each two Parallel Sessions takes place in the *Sala Caboto*. On Thursday there will be three Parallel Sessions; the third session takes place in the *Magellano Room.*

Tuesday, August 29, 2006

08:00 **Registration**

09:00 **Opening Session, chaired by D. Ruan**

Welcome address
P. Fantoni (Institutt for Energiteknikk, Halden, Norway)
G. Pericu (Major of the City of Genova, Italy)
G. Vernazza (Director of the Engineering Faculty, University of Genova, Italy)

Progress of FLINS conferences (1994 – 2006)
D. Ruan (SCK•CEN and Ghent University, Belgium)

09:45 **Plenary Session, chaired by E. E. Kerre**

L.-A. Zadeh
A New Frontier in Computation – Computation with Information Described in Natural Language

10:30 **Coffee break**

10:50 **Plenary Session, chaired by P. Fantoni**

F. Øwre
Integrated Operations in Arctic Environments

11:40 **Plenary Session, chaired by M. De Cock**

E. Sanchez
Can the Semantic Web be Designed without Using Fuzzy Logic?

12:30 **Lunch**

14:00 **Soft Computing Applied to Signal Analysis in Nuclear Reactors**
Chaired by M. Marseguerra and E. Zio

Robust Distance Measures for On-Line Monitoring: Why Use Euclidean?
D.R. Garvey and J.W. Hines

Multiple Objective Evolutionary Optimisation for Robust Design
D.E. Salazar A., C.M. Rocco S., and E. Zio

Feature Selection for Transients Classification by a Niched Pareto Genetic Algorithm
E. Zio, P. Baraldi, and N. Pedroni

Optimized Direct Fuzzy Model Reference Adaptive Control Applied to Nuclear Reactor Dynamics
F. Cadini and E. Zio

Model of Fuzzy Expert System for the Calculation of Performance and Safety Indicator of Nuclear Power Plants
K.C. Souto and R. Schirru

User Interface for Validation of Power Control Algorithms in a Triga Reactor
J.S. Benítez-Read, C.L. Ramírez-Chávez, and D. Ruan

14:00 **Data mining: Models, Techniques, and Applications**
Chaired by T. Li

A Novel Gaussian Processes Model for Regression and Prediction
Y. Zhou, T. Zhang, and Z.Lu

Optimized Algorithm of Discovering Functional Dependencies with Degrees of Satisfaction
Q. Wei and G. Chen

From Analogy Reasoning to Instances based Learning
W. Pan and T. Li

Analysing Success Criteria for ICT Projects
K. Milis and K. Vanhoof

Identification of Seismic Activities through Visualization and Scale-Space Filtering
C. Qin, Y. Leung, and J. Zhang

The Specificity of Neural Networks in Extracting Rules from Data
M. Holeña

15:30 **Coffee break**

16:00 **Optimization Metaheuristics in Nuclear Science and Engineering**
Chaired by C. M. N. A. Pereira

Particle Swarm Optimization Apllied to the Combinatorial Problem in order to Solve the Nuclear Reactor Fuel Reloading Problem
A. Meneses and R. Schirru

Use of Genetic Algorithm to Optimize Similar Pressurizer Experiments
D. Botelho, P. de Sampaio, C. Lapa, C. Pereira, M. Moreira, and A. Barroso

Particle Swarm Optimization Applied to the Nuclear Core Reload Problem
M. Waintraub, R.P. Baptista, R. Schirru, and C. Pereira

Parallel Evolutionary Methods Applied to a PWR Core Reload Pattern Optimization

R. Schirru, A. de Lima, and M.D. Machado

Artificial Intelligence Applied to Simulation of Radiation Damage in Ferritic Alloys
R.P. Domingos, G.M. Cerchiara, F. Djurabekova, and L. Malerba

Signal Grouping Algorithm for an Improved on-line Calibration Monitoring System
M. Hoffmann

Intelligent Transient Normalisation for Improved Empirical Diagnosis
D. Roverso

Identification of Transients in Nuclear Systems by a Supervised Evolutionary Possibilistic Clustering Approach
E. Zio, P. Baraldi, and D. Mercurio

16:00 **Foundations and Recent Developments**
Chaired by A. Vroman

Minimizing the Number of Affected Concepts in Handling Inconsistent Knowledge
E. Grégoire

New Operators for Context Adaptation of Mamdani Fuzzy Systems
A. Botta, B. Lazzerini, and F. Marcelloni

Li-Yorke Chaos in a Spatiotemporal Chaotic System
P. Li, Z.Li, W.A. Halang, and G. Chen

On PCA Error of Subject Classification
L.H. Feng, F.S. Hu, and L.Wan

Combining Validity Indexes and Multi-Objective Optimization based Clustering

T. Özyer and R. Alhajj

Evaluation Characteristics for Multilayer Perceptrons and Takagi Sugeno Models
W. Kaestner, T. Foerster, C. Lintow, and R. Hampel

Using Parametric Functions to Solve Systems of Linear Fuzzy Equations — an Improved Algorithm
A. Vroman, G. Deschrijver, and E.E. Kerre

Numerical Implementation Strategies of the Fuzzy Finite Element Method for Application in Structural Dynamics
D. Moens and D. Vandepitte

18:00 **Welcome Reception**

Wednesday, August 30, 2006

08:30 **Registration**

09:00 **Plenary Session, chaired by G. Chen**

Z. Bien
Learning Techniques in Service Robotic Environment

09:45 **Plenary Session, chaired by M. Nachtegael**

D. Mundici
Foundations of Many-Valued Reasoning

10:30 **Coffee break**

11:00 **Applied Research and Nuclear Applications**
Chaired by J.S. Benítez-Read

Studying on Acceleration Sensor's Fault-Tolerance Technology of Tilting Trains
J. Lin, Y. Zhang, Y. Gao, and T. Li

A Risk-Risk Analysis based Abstraction Approach to Societal Problem-Solving in Nuclear Systems
S. Rao

A Fuzzy Logic Methodology for Open Source Information Synthesis in a Non-Proliferation Framework
I. Maschio

A Financial-Option Methodology for Determining a Fuzzy Discount Rate in Radioactive Waste Management
P.L. Kunsch

Application of Intelligent Decision System to Nuclear Waste Depository Option Analysis
D.L. Xu, J.B. Yang, B. Carlé, F. Hardeman, and D. Ruan

A Fuzzy-Logic-Based Methodology for Signal Trend Identification
E. Zio and I.C. Popescu

11:00 **Data Analysis for Mass Spectrometric Problems**
Chaired by F.-M. Schleif

Machine Learning and Soft-Computing in Bioinformatics — A Short Journey
F.-M. Schleif, T. Villmann, T. Elssner, J. Decker, and M. Kostrzewa

Full-Length HPLC Signal Clustering and Biomarker Identification in Tomato Plants
M. Strickert, T. Czauderna, S. Peterek, A. Matros, H.-P. Mock, and U. Seiffert

Feature Scoring by Mutual Information for Classification of Mass Spectra
C. Krier, D. François, V. Wertz, and M. Verleysen

Peak Intensity Prediction for PMF Mass Spectra Using Support Vector Regression
W. Timm, S. Böcker, T. Twellmann, and T.W. Nattkemper

12:30 **Lunch**

14:00 **Plenary Session, chaired by F. Masulli**

G. Valle
Discovering Functional Elements in Genomic Sequences

14:50 **Invited Guests, chaired by P. Fantoni**

SIIT - Integrated Intelligent System Technologies: A University-Industry Joint R&D Initiative in the Ligurian Region
G. Casalino

Geometrical Methods for Signal Decomposition and Reconstruction
F. de Mari

14:50 **Meeting of the INNS Special Interest Group on Bioinformatics**

15:30 **Coffee break**

16:00 **Decision Making and Knowledge Discovery**
Chaired by L. Martínez

A Functional Tool for Fuzzy First Order Logic Evaluation
V. López, J.M. Cleva, and J. Montero

A Linguistic 360-Degree Performance Appraisal Evaluation Model
R. de Andrés, J.L. García-Lapresta, and L. Martínez

An Interactive Support System to Aid Experts to Express Consistent Preferences
S. Alonso, E. Herrera-Viedma, F. Herrera, F.J. Cabrerizo, and F.Chiclana

Considerations on Uncertain Spatio-Temporal Reasoning in Smart Home Systems
J. Liu, J.C. Augusto, and H. Wang

Two Stage Fuzzy Clustering based on Knowledge Discovery and its Application
Y. Qian

Application of Support Vector Machines to the Modelling and Forecasting of Inflation
M. Marcek and D. Marcek

Assessing the Reliability of Complex Networks: Empirical Models based on Machine Learning
C.M. Rocco and M. Muselli

16:00 **CIBB 2006 - International Meeting on Computational Intelligence Methods for Bioinformatics and Biostatistics**
Chaired by F. Masulli

Learning Comprehensible Classification Rules from Gene Expression Data Using Genetic Programming and Biological Ontologies
B. Goertzel, L. Coelho, C. Pennachin, I. Goertzel, M. Queiroz, F. Prosdocimi, and F. Lobo

Protein Secondary Structure Prediction: How to Improve Accuracy by Integration

L. Palopoli, S.E. Rombo, G. Terracina, G. Tradigo, and P. Veltri

The Stabilization Effect of the Triplex Vaccine
F. Pappalardo, S. Motta, E. Mastriani, M. Pennisi, and P.-L. Lollini

Learning Classifiers for High-Dimensional Micro-Array Data
A. Bosin, N. Dessì, and B. Pes

Prediction of Residue Exposure and Contact Number for Simplified HP Lattice Model Proteins Using Learning Classifier Systems
M. Stout, J. Bacardit, J.D. Hirst, J. Blazewicz, and N. Krasnogor

A Study on the Effect of Using Physico-Chemical Features in Protein Secondary Structure Prediction
G.L.J. Rama, M. Palaniswami, D. Lai, and M.W. Parker

Gene Expression Data Analysis in the Membership Embedding Space: A Constructive Approach
M. Filippone, F. Masulli, and S. Rovetta

BICA and Random Subspace Ensembles for DNA Microarray-Based Diagnosis
B. Apolloni, G. Valentini, and A. Brega

18:30 **Transfer to the gala dinner place by bus (from President Hotel)**

18:50 **Guided tour at Villa il Palazzo, an historical landmark of the city of Genova**

19:30 **Gala Dinner**

22:30 **Transfer to President Hotel**

Thursday, August 31, 2006

08:30 **Registration**

09:00 **Plenary Session, chaired by E. E. Kerre**

M. M. Gupta
Fuzzy Arithmetic and Fuzzy Neural Computing:
From Basics to Advanced Theory

09:45 **Plenary Session, chaired by Z. Bien**

P. P. Wang
The Role of Soft Computing in Applied Sciences

10:30 **Coffee break**

11:00 **Fuzzy Decision-Making in Industrial Engineering I**
Chaired by C. Kahraman

Field Theory and Computing with Words
G. Resconi and M. Nikravesh

Fuzzy Time Series Modelling by SCL Learning
M. Marcek and D. Marcek

Investment Analysis Using Grey and Fuzzy Logic
C. Kahraman and Z. Ulukan

An Extended Branch-And-Bound Algorithm for Fuzzy Linear Bilevel Programming
G. Zhang, J. Lu, and T. Dillon

Fuzzy Multi-Objective Interactive Goal Programming Approach to Aggregate Production Planning
T. Ertay

Fuzzy Linear Programming Model for Multiattribute Group Decision Making to Evaluate Knowledge Management Performance
Y.E. Albayrak and C. Erensal

11:00 **Automation, Intelligence, and Robotics**
Chaired by Z.-G. Hou and M. M. Gupta

Developmental Robotics and Robot Development (invited)
G. Sandini

An Approach of Mobile Robot Environment Modeling based on Ultrasonic Sensors Array Principal Components
Y.Q. Zhang, F. Li, H.M. Wang, Z.G. Hou, M. Tan, M.M Gupta, and P.N. Nikiforuk

Slam with Corner Features from a Novel Curvature-based Local Map Representation
R. Vazquez-Martin, P. Nuñez, J.C. Del Toro, A. Bandera, and F. Sandoval

Obstacle Avoidance Learning for Biomimetic Robot Fish
Z. Shen, M. Tan, Z. Cao, S. Wang, and Z. Hou

Snake-Like Behaviors Using Macroevolutionary Algorithms and Modulation based Architectures
J.A. Becerra, F. Bellas, R.J. Duro, and J. de Lope

Stable Neural Architecture of Dynamic Neural Units with Adaptive Time Delays
I. Bukovsky, J. Bila, and M.M. Gupta

11:00 **Intuitionistic Fuzzy Sets and Applications in Image Processing**
Chaired by I. K. Vlachos and G. D. Sergiadis

On the Probability and Random Variables on IF Events
B. Riecan

Multicriteria Map Overlay in Geospatial Information System via Intuitionistic Fuzzy AHP Method
T.Silavi, M.R. Malek, and M.R. Delavar

On the Intuitionistic Defuzzification of Digital Images for Contrast Enhancement
I.K. Vlachos and G.D. Sergiadis

A Heuristic Approach to Intuitionistic Fuzzification of Color Images
I.K. Vlachos and G.D. Sergiadis

Intuitionistic Fuzzy Feature Extraction for Query Image Retrieval from Colour Images
K.S. Babu and R.S. Kumar

Classification with Intuitionistic Fuzzy Region in Geospatial Information System
M.R. Malek, J. Karami, and S. Aliabady

Combining AdaBoost with a Hill-Climbing Evolutionary Feature Search for Efficient Training of Performant Visual Object Detectors
Y. Abramson, F. Moutarde, B. Stanciulescu, and B. Steux

12:30 **Lunch**

14:00 **Fuzzy Decision-Making in Industrial Engineering II**
Chaired by C. Kahraman

Product-Mix Decision with Compromise LP Having Fuzzy Objective Function Coefficients (CLPFOFC)
S. Susanto, P. Vasant, A. Bhattacharya, and C. Kahraman

Modeling the Supply Chain: A Fuzzy Linear Optimization Approach
N.Y. Ates and S. Cevik

Evaluating Radio Frequency Identification Investments Using Fuzzy Cognitive Maps
A.. Ustundag and M. Tanyas

Multi-Attribute Comparison of Ergonomic Mobile Phone Design based on Information Axiom
G. Yucel and E. Aktas

Facility Location Selection Using a Fuzzy Outranking Method
I. Kaya and D. Cinar

Evaluation of the Suppliers' Environmental Management Performances by a Fuzzy Compromise Ranking Technique
G. Büyüközkan and O. Feyzioglu

14:00 **E-service Intelligence**
Chaired by J. Lu

Information Integration based Team Situation Assessment in an Uncertain Environment
J. Lu and G. Zhang

Evaluation of E-Service Providers Using a Fuzzy Multi-Attribute Group Decision-Making Method
C. Kahraman and G. Büyüközkan

Design and Implementation of an E-Commerce Online Game for Education and Training
P. Zhang, M. Fang, Y. Zeng, and J. Yu

Web Intelligence
Chaired by E. Damiani

Selection Model of Semantic Web Services
X. Wang, Y. Zhao, and W.A. Halang

A Trust Assertion Maker Tool
P. Ceravolo, E. Damiani, M. Viviani, A. Curcio, and M. Pinelli

Web Access Log Mining with Soft Sequential Patterns
C. Fiot, A. Laurent, and M. Teisseire

14:00 **Applied Research**
Chaired by R.M. de Moraes

On-line Training Evaluation in Virtual Reality Simulators Using Fuzzy Bayes Rule
R.M. de Moraes and L.S. Machado

Assessement of Gynecological Procedures in a Simulator based on Virtual Reality
L.S. Machado, M.C. de Oliveira Valdek, and R.M. de Moraes

Screaming Racers: Competitive Autonomous Drivers for Racing Games
F. Gallego, F. Llorens, and R. Satorre

Neuro-Fuzzy Modeling for Fault Diagnosis in Rotating Machinery
E. Zio and G. Gola

FLC Design for Electric Power Steering Automation
J.E. Naranjo, C. González, R. García, and T. de Pedro

15:30 **Coffee break**

16:00 **Fuzzy Decision-Making in Industrial Engineering III**
Chaired by C. Kahraman

A Fuzzy Multiattribute Decision Making Model to Evaluate Knowledge based Human Resource Flexibility Problem
M.E. Genevois and Y.E. Albayrak

Fuzzy Evaluation of on the Job Training Alternatives in Industrial Companies
G. Kayakutlu, G. Büyüközkan, B.C. Metin, and S. Ercan

A Study of Fuzzy Analytic Hierarchy Process: an Application in Media Sector
M. Özyol and Y.E. Albayrak

Prioritization of Relational Capital Measurement Indicators Using Fuzzy AHP
A. Beskese and F.T. Bozbura

A Consensus Model for Group Decision Making in Heterogeneous Contexts
L. Martínez, F. Mata, and E. Herrera-Viedma

Scheduling a Flowshop Problem with Fuzzy Processing Times Using Ant Colony Optimization
S. Kiliç and C. Kahraman

Time Dependent Vehicle Routing Problem with Fuzzy Traveling Times under Different Traffic Conditions
T. Demirel and N.C. Demirel

16:00 **Risk Analysis**
Chaired by C. Huang

Another Approach to Test the Reliability of a Model for Calculating Fuzzy Probabilities
C. Huang and D. Jia

An Improved ECC Digital Signature Algorithm and Application in E-Commerce
X.P. Xu

Fuzzy Approximation Network Perturbation Systems and its Application to Risk Analysis in Transportation Capacity
K. Zou

Application of Artificial Neural Networks in the Flood Forecast
L. Feng and J. Lu

Risk Analysis and Management of Urban Rainstorm Water Logging in Tianjin
S. Han, Y. Xie, and D. Li

Practical Research of the Flood Risk based on Information Diffusion Theory
X. Zhang and L. Feng

Risk Analysis for Agricultural Drought based on Neural Network Optimized by Chaos Algorithm
L. Qiu, X. Chen, C. Duan, and Q. Huang

A Computer Simulation Method for Harmony among Departments for Emergency Management
F. Yang and C. Huang

16:00 **Recent Developments**
Chaired by G. Resconi and Q. Wei

Research on Improved Multi-Objective Particle Swarm Optimization Algorithms
D. Zhao and W. Jin

Intelligent System Supporting Non-Destructive Evaluation of SCC Using Eddy Current Test
S. Kanemoto, W. Cheng, I. Komura, M. Shiwa, and S. Tsunoyama

The Continuous-Sentential KSSL Recognition and Representation System Using Data Glove and Motion Tracking based on the Post Wearable PC
J.H. Kim and K.S. Hong

Many-Valued Logic and Uncertainty Reasoning
Chaired by Y. Xu

Lukasiewicz Algebra Model of Linguistic Values of Truth and Their Reasoning
L. Yi, Z. Pei, and Y. Xu

Weighting Qualitative Fuzzy First-Order Logic and its Resolution Method
L. Zou, B. Li, W. Wang, and Y. Xu

A Model of Decision-Making with Linguistic Information based on Lattice-Valued Logic
J. Ma, S. Chen, and Y. Xu

A Fuzzy Multi-Objective Evaluation Model in Supply Chain Management
X. Liang, Z. Zhang, D. Zhu, and B. Tang

NOTES