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RECENT ADVANCES in FUZZY SYSTEMS

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Proceedings of the 10th WSEAS Int. Conf. on FUZZY SYSTEMS (FS'09)

Prague, Czech Republic, March 23-25, 2009

Artificial Intelligence Series
A Series of Reference Books and Textbooks

Prof. Lotfi Zadeh
(Father of Fuzzy Logic)
in the WSEAS Conference of the
University of Cambridge, UK

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Preface

This year the 10th WSEAS International Conference on FUZZY SYSTEMS (FS'09) was held in Prague, Czech Republic. The Conference remains faithful to its original idea of providing a platform to discuss theoretical and applicative aspects of fuzzy sets, fuzzy algebra, fuzzy analysis, fuzzy geometry, fuzzy differential equation, interval analysis, fuzzy optimization, fuzzy control, Takagi-Sugeno methodologies 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

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Plenary Lecture 1

Integrating Fuzzy Regression and Fuzzy Time Series into Knowledge-Based Modelling

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Abstract: The regression methods and time series models have a long history of applications to data analysis and statistical inference dealing with randomness of the modelling systems.
Modelling techniques based on fuzzy sets, especially fuzzy rule based models are suitable for modelling nonlinear and complex systems with imprecise information concerning the system structure and variables. The rules can be seen as local submodels of the system, operating in particular fuzzy regions.
In this work we present the methods of the creating the probabilistic-fuzzy knowledge base and the inference procedure. The rules have fuzzy antecedents representing linguistic values of input variables and consequents in the form of fuzzy regression equations or fuzzy time series models. This approach can be seen as an extension of the concept of Takagi-Sugeno fuzzy models.
Such knowledge base and inference procedure, as parts of an expert system, are capable of supporting human decisions in control, prediction, diagnosis and in many fields of activity.

Brief Biography of the Speaker: Anna Walaszek-Babiszewska was born in Wroclaw, Poland. She received M. Sc. degree (1970) in Control Engineering from the Technical University of Wroclaw, Wroclaw, Poland. Since 1970 she has been with the Silesia University of Technology, Gliwice, Poland, where she received Ph. D. and D. Sc. (Habilitation) degrees in 1980 and 1994, respectively. At present, she is a professor at the Opole University of Technology, Department of Control and Computer Engineering, Opole, Poland.
Her research interests include: stochastic and fuzzy modeling, knowledge-based systems, systems identification, data analysis, and applications in technological and managerial situations.
She has supervised 3 and reviewed 5 Ph.D dissertations in engineering and economic sciences. She has published 2 monographic books on stochastic and fuzzy modeling and over 80 scientific papers.
She was a member of the Management Editorial Board (2000-2005) and the Lecture Notes in Control and Computer Science Editorial Board (2003) of the Zielona Gora University Press, Zielona Gora, Poland. She is a member of the Section of Cybernetics in Mining, Mining Committee of the Polish Academy of Sciences (since 1999).

Plenary Lecture 2

Fuzzy Techniques for Sensors

Associate Professor Valentina E. Balas
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Faculty of Engineering
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Abstract: A good strategy to improve the technologies is to provide them with useful pieces of deterministic previous knowledge about the processes and the equipment. The lecture is focused on the industrial systems, implemented with low level devices that need knowledge on the controlled plants as well as on the general theoretical foundations. This can be done by the help of internal models, or with planners whose design is performed by simulations. A particular architecture of sensors relying on modeling techniques and some internal model estimators for different applications is presented.

Brief Biography of the Speaker: Valentina E. Balas is currently an Associate Professor in the Department of Automatics and Applied Informatics at the Faculty of Engineering, University "Aurel Vlaicu" Arad (Romania). She holds a Ph.D. in Applied Electronics and Telecommunications from Polytechnic University of Timisoara since 2003. She is author of more than 90 research papers in refereed journals and International Conferences. Her research interests are in Intelligent Systems, Fuzzy Control, Smart Sensors, Information Fusion, Modeling and Simulation.
She is Editor-in Chief to International Journal of Advanced Intelligence Paradigms (IJAIP) and member in Editorial Boards for national and international journals.
She participated in many international conferences as General Chair, Organizer, Session Chair and member in International Program Committee
Dr. Valentina E. Balas has a great experience in research projects. She is member of EUSFLAT, ACM and a Senior Member IEEE.

Plenary Lecture 3

The Fuzzy-Interpolative Adaptive Controllers

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Abstract: The lecture is discussing the fundamental sides of the fuzzy sets: the interpolative one. Since any fuzzy controller can be approximated by a corresponding interpolative one, the linear interpolations can be fully applied in almost any fuzzy sets application. The fuzzy-interpolative controllers are fuzzy controllers that may be equaled with linear interpolative networks. They are alloying the advantages of the linguistic representation of knowledge offered by the fuzzy side with the easiness of the interpolative implementations. Some applications focused on adaptive control and expert systems are presented.

Brief Biography of the Speaker: Marius M. Balas is currently an Associate Professor in the Department of Automatics and Applied Informatics at the Faculty of Engineering, University "Aurel Vlaicu" Arad (Romania). He holds a Ph.D. in Applied Electronics and Telecommunications from Polytechnic University of Timisoara since 2001. He is author of more than 80 research papers in refereed journals and International Conferences. His research interests are in Fuzzy-Interpolative Controllers, Air conditioning, greenhouses, ABS braking and Autonomous Intelligent Cruise Control, etc.
He is member in Editorial Boards for national and international journals and participated in many international conferences as Organizer, Session Chair and member in International Program Committee.
Dr. Marius M. Balas has a great experience in research projects. He is member of EUSFLAT a Senior Member IEEE.

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