Editors: Imre J. Rudas, Azami Zaharim,
Kamaruzzaman Sopian, Jiri Strouhal

Recent Researches in Artificial Intelligence & Database Management

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Proceedings of the 11th WSEAS International Conference on
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Preface

This year the 11th WSEAS International Conference on Artificial Intelligence, Knowledge Engineering and Data Bases (AIKED '12) was held in Cambridge, UK, in February 22-24, 2012. The conference provided a platform to discuss neural networks, algorithms, fuzzy systems, information and knowledge engineering, information retrieval systems, image processing, knowledge and information management techniques, data mining techniques, software tools and support, performance evaluation techniques 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 sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to 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

New Approaches in Information Aggregation

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Abstract: The problem of aggregating information represented by fuzzy sets in a meaningful way has been of central interest since the late 1970s. In most cases, the aggregation operators are defined on a pure axiomatic basis and are interpreted either as logical connectives (such as t-norms and t-conorms) or as averaging operators allowing a compensation effect (such as the arithmetic mean).
On the other hand, it can be observed by some empirical tests that the above-mentioned classes of operators differ from those ones that people use in practice. Therefore, it is important to find operators that are, in a sense, mixtures of the previous ones, and allow some degree of compensation.
This talk summarizes the research results of the author and his co-workers that have been carried out in recent years on generalization of conventional aggregation operators. This includes, but is not limited to, the class of uninorms and nullnorms, absorbing norms, distance- and entropy-based operators.

Brief Biography of the Speaker: Imre J. Rudas graduated from Banki Donat Polytechnic, Budapest in 1971, received the Master Degree in Mathematics from the Eotvos Lorand University, Budapest, the Ph.D. in Robotics from the Hungarian Academy of Sciences in 1987, while the Doctor of Science degree from the Hungarian Academy of Sciences in 2004. He received his first Doctor Honoris Causa degree from the Technical University of Kosice, Slovakia and the second one from “Polytechnica” University of Timisoara, Romania.
He is active as a full university professor. He served as the Rector of Budapest Tech from August 1, 2003 for a period of four years, and was reelected for three years in 2007. From 2010 Budapest Tech is changed to Obuda University and he was elected as the rector for five years.
He is a Fellow of IEEE, Senior Administrative Committee member of IEEE Industrial Electronics Society, member of Board of Governors of IEEE SMC Society, Chair of IEEE Hungary Section and Vice-President of the Hungarian Academy of Engineering.
He is the treasurer of IFSA (International Fuzzy System Association), he had been the President of Hungarian Fuzzy Association for ten years.
He serves as an associate editor of some scientific journals, including IEEE Transactions on Industrial Electronics, member of editorial board of Journal of Advanced Computational Intelligence, member of various national and international scientific committees. He is the founder of the IEEE International Conference Series on Intelligent Engineering Systems (INES) and IEEE International Conference on Computational Cybernetics (ICCC), and some international symposia. He has served as General Chairman and Program Chairman of numerous scientific international conferences.
His present areas of research activity are Computational Cybernetics, Robotics with special emphasis on Robot Control, Soft Computing, Computed-aided Process Planning, Fuzzy Control and Fuzzy Sets. He has published books, more than 500 papers in books, various scientific journals and international conference proceedings. He received more than 750 citations for his publications.

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Plenary Lecture 2

Fuzzy Multicriteria analysis for Optimal Choice of Oil/NG Pipelines Routing – A Knowledge Based Approach

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Abstract: Numerous projects of oil and natural gas (NG) supply chain are under construction worldwide for the establishment of new networks and facilities or for the extension of existing ones. From these projects, each one maintains its own design philosophy and technological concept. However, for managers and engineers, the selection of an optimum supply route demonstrates an essential techno-economical decision making problem associated with security of supply, environmental acceptance, investment cost and future networking. In practice, this problem is managed in pre-construction initiations, when feasibility and planning of projects are elaborated. This presentation considers a framework, under the form of an algorithmic procedure, for the evaluation of supply routes and decision-making. Problems of the framework, related with low availability of critical technical information and deficiencies of engineering companies to manage their corporate knowledge, are reported. A multicriteria analysis methodology, based on a Delphi technique for experts' knowledge elicitation and quantification, is proposed as a practical solution to face the problems and to support the decision making process. A case study demonstrating applicability of the proposed methodology by using a fuzzy PROMETHEE version is also presented, examining several alternative solutions associated with the expansion of the inland natural gas supply chain in Greece. It is proved that the methodology suggested (i) allows elicitation and transforming of experts' tacit knowledge to explicit (quantitative), by using questionnaires for scoring of criteria and alternative solutions, (ii) overcomes problems of experts' unavailability through submission and recollection of questionnaires over long distances (by applying Delphi method techniques), (iii) reduces utilization of improper know-how from poorly maintained technical archives, (iv) enables less dependence on know-how and technology transfer collaborations, as mainly focused in utilizing captured tacit knowledge of experts; (v) anticipates limitation in economic and technological collaborations, since, at pre-construction phases, the budgets are limited and the time constraints pressing; (vi) allows incorporation of knowledge intensive criteria like know-how acquisition requirements and know-how diffusion perspectives.

Brief Biography of the Speaker: Prof. Fragiskos Batzias holds a 5years Diploma and a PhD degree in Chemical Engineering, and a BSc in Economics. He has also studied Mathematics and Philosophy. He is Director of the Laboratory of Simulation of Industrial Processes and Head of the Research Group on Systems Analysis at the Department of Industrial Management and Technology of the University of Piraeus, Greece. He is teaching at the interdepartmental postgraduate courses (i) Systems of Energy Management and Protection of the Environment, running by the University of Piraeus in cooperation with the Chem. Eng. Dept. of the Nat. Tech. Univ. of Athens, and (ii) Techno-Economic Systems, running by the Electr. & Comp. Eng. Dept. of the Nat. Tech. Univ. of Athens in cooperation with the University of Athens and the University of Piraeus. His research interests are in chemical engineering systems analysis and knowledge based decision making. He has >100 publications in highly ranked journals and conference proceedings, including 29 research monographs in collective volumes, with 171 citations and an h-index of 8 (for the period 2004-2011, source: ISI Web of Science, Thompson Scientific; self-citations have been excluded).
He has participated (and chaired after invitation from the organizers) in prestigious international conferences, such as those organized periodically by the IEEE, the European Federation of Chemical Engineering (EFCE), the DECHEMA, CHISA, WSEAS Organizations. He organizes the annual Symposium on Industrial and Environmental Case Studies running successfully since 2004 within the International Conference of Computational Methods in Sciences and Engineering (ICCMSE).

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Plenary Lecture 3

Artificial intelligence in Supervised learning

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Abstract: Supervised learning is based on principles of programmed learning powered by artificial intelligence.. Supervised learning is created to define precisely learn-ing content, to fix activities which will enable success, pruvide conditions and means for that, create favourable psychological climate for acquiring knowledge, its control and development of human capabilities. On the other hand, supervised learning resu-lts from teacher's need to know how much and how pupils learns, what are their difficulties and how it is possible, to eliminate them. New educational technology, powered by artifitiel inteligence, has influence on introducing important changes in organization of educational institutions, contents and methods of teaching activity as well as in relations in institutions that are con-ducting teaching and education. Here we shall talk about supervised learning and intelligent software in order to indicate their place and role in modern teaching. Conditions are made for raising maximum success with minimum efforts and there are instruments and possibilities for adequate evaluaation of young people work. It is also achieved therewith that learning becomes entertaining to a certain degree and it engages pupils attention more strongly. The fact that programmed teaching takes care about intelligence, knowledge, level of reading skill of pupils, results of diagno-stic tests and teacher grade, also contributes to its quality. In supervised teaching information is usually given, a problem stated that pupil should solve, after that pupil gives his solution, does the operation (in case it is not automatically solved) to see the solution given by programmer, does comparison, eventual corrections and completions, gets a grade and instructions for further work. Thus dynamized learning is suitable to psychological characteristics of child and for that reason he is tireless in work in his first contacts with supervised teaching. Supervised learning is sometimes called autoinstruction, auto-matic instruction or selfinstruction because function of teacher in giving information is reduced to minimum or, in some cases, it is not evident at all. It is the reason why „pedagogical fashionable persons“ give brave statement that modern computers will replace teacher. However, researches have shown that “learning machines” are only one (truly very improved) tea-ching aid, but they do not replace teacher but influence gradual change of his function, to create new possibilities for learning and advancement of teaching. Therefore, it is a false dilemma „machines or man“, and real solution is „intelligent machines in hands of man“.

Brief Biography of the Speaker: Danimir Mandic graduated at the Faculty of Mechanical engineering in Sarajevo, in the area of Information systems. Masters degree got at the University of Belgrade in the area of Information systems in traffic engineering. At the Faculty of technical sciences in Novi Sad he got a DSc in the area of Information systems in traffic engineering, and he got PhD at the University of East Sarajevo in the area of Educational technology. He was a postgraduate student at the Michigan State University at the department of Computer Sciences.
He is a full professor of Informatics and educational technology at the University of Belgrade in Serbia (from 2002) and a chief of Department of Didactics and Educational Technology. From 1987. up to 1992 he was assistant at the Faculty of Traffic Engineering in Sarajevo (Bosnia and Herzegovina). from 1992. he is professor at the Faculty of Teacher Training in Belgrade (Serbia).
Danimir Mandic published more than 70 scientific papers and 18 books in the area of Informatics and Educational Technology. He was a leader in three scientific projects: Educational software for students, Interactive multimedia classroom and Distance education systems for high education. Currently he is the leader in scientific project: Evaluation of the Curriculum at the Teacher Training faculties in Serbia using modern technologies and distance education. He is the author of several innovations in education. He created multimedia software for learning informatics, and Distance learning software for students. His area of iterest is modern educational technology , artificial intelligence and coputer science.
Danimir Mandic is advanced tester and coordinator for European Computer Driving Licence in Serbia.

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