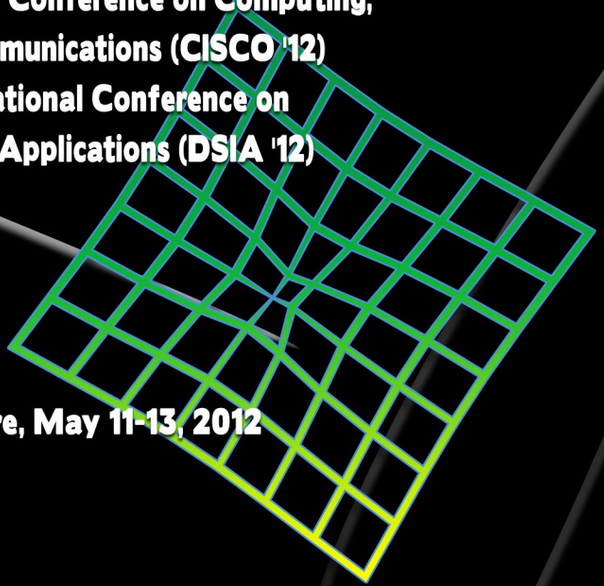
Editors

Nikos Mastorakis
Valeri Mladenov
Zoran Bojkovic

Latest Advances in Information Science and Applications

- Proceedings of the 12th WSEAS International Conference on Applied Computer Science (ACS '12)
- Proceedings of the 1st International Conference on Computing, Information Systems and Communications (CISCO '12)
- Proceedings of the 1st International Conference on Digital Services, Internet and Applications (DSIA '12)

Singapore City, Singapore, May 11-13, 2012



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Preface

This year the 12th WSEAS International Conference on Applied Computer Science (ACS '12), the 1st International Conference on Computing, Information Systems and Communications (CISCO '12) and the 1st International Conference on Digital Services, Internet and Applications (DSIA '12) were held in Singapore City, Singapore, May 11-13, 2012. The conferences provided a platform to discuss computers for education, distance learning, classroom monitoring, education reforms, web-based education, educational software and development, privacy issues for education, web-management of education, environment and educational technologies, management of educational institutes, quality assurance in educational technologies etc. with participants from all over the world, both from academia and from industry.

Their 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 these conferences 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.

Conferences such as these 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

Active Knowledge for the Control of Product Definition

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Abstract: Definition of product in the form of fully integrated product model has brought new era in product related engineering activities. Recent research and industrial development efforts concentrate on including company and product specific active knowledge in product model. This knowledge is applied to give adaptive characteristics for product modeling by capabilities of modification model entities when a former defined situation or event changes. The presentation outlines recent results in this area and details essential methods from the leading industrial practice. After a short historical introduction, it characterizes recent essential and engineer understandable knowledge representations. Relating product objects by parameter, formula, rule, check, and reaction definitions are emphasized. Following this, possibilities for integration procedures and optimization algorithm in product model are explained. In the context of the above issues, research results achieved at the Obuda University, Hungary in influence request knowledge based engineering object definition in product model are introduced. Presentation also discusses recent achievements in information exchange between virtual and physical environments. It concentrates on application of recent results in artificial intelligence and knowledge engineering in model based product definition. It considers industrially applied product modeling technology and research motivated by solving real actual industrial problems.

Brief Biography of the Speaker: Laszlo Horvath is university professor of virtual engineering systems at the Obuda University, John von Neumann Faculty of Informatics. He received the M.Sc. degree in programmable controlled manufacturing from the Budapest University of Technology and Economics in 1971. He received the Ph.D. degree from the Hungarian Academy of Sciences in 1993 and from the Budapest University of Technology and Economics in 1994 in modeling and computer aided development of industrial processes.
During the past three decades, he filled several research and higher education positions in various areas of computer assisted engineering. He joined the predecessor of the Obuda University in 1992. Presently, he also serves as Vice President of Council of the Applied Informatics Doctoral School, Obuda University. His current research interests are intelligent modeling of products, human-computer interaction in engineering processes, and virtual spaces for engineers. He authored and coauthored near three hundred journal and conference papers in these areas.

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Plenary Lecture 2

Computer Aided Diagnosis System for Early Detection of Breast Cancer

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Abstract: Breast cancer is one of the major causes of death among women. Small clusters of micro calcifications appearing as collection of white spots on mammograms show an early warning of breast cancer. Early detection performed on X-ray mammography is the key to improve breast cancer diagnosis. In order to increase radiologist's diagnostic performance, several computer-aided diagnosis (CAD) schemes have been developed to improve the detection of primary identification of this disease. The proposed talk will address the following approaches:
- A method will be discussed for medical image enhancement based on the well established concept of fractal derivatives and selecting image processing techniques like segmentation of an image with self similar properties. This has been tested over several images of image databases taken from BSR APPOLO centre for cancer research and diagnosis, India;
- An adaptive k-means clustering algorithm has been developed for breast image segmentation detecting micro calcifications. The algorithm works faster so that any radiologist can take a clear decision about the appearance of micro calcifications by visual inspection of digital mammograms and detection accuracy has also been improved as compared to some existing works;
- The current study investigates whether structural properties of the tissue in contiguous microcalcifications can contribute to breast cancer identification. Structural analysis of tissue in contiguous MCs shows promising results in computer-aided diagnosis of breast cancer and contributes to the reduction of unnecessary biopsies.
- Research works were carried out that remove or attenuate the curvilinear structures present in a mammogram and corresponding to the blood vessels, veins, milk ducts, speculations and fibrous tissue.

Brief Biography of the Speaker: Dr. G. R. Sinha is Professor (Electronics & Tele.) & Associate Director in Faculty of Engineering and Technology of Shri Shankaracharya Group of Institutions (Technical Campus) Bhilai, India. He obtained his B.E. (Electronics) and M.Tech. (Computer Technology) from Govt. Engineering College (Now National Institute of Technology, Raipur. He received Gold Medal for obtaining first position in the University. He received his Ph.D. in Electronics & Telecommunication from Chhattisgarh Swami Vivekanand Technical University, India. His research interest includes Digital Image Processing and it applications in biometric security, forensic science, pattern recognition, early detection of breast cancer, content retrieval of underwater imaging, neuro-fuzzy based Vehicle license plate recognition, multimodal biometrics etc. He has published 95 research papers in various international and national journals and conferences. He is active reviewer and editorial member of more than 12 international journals such as Applied Physics Research of Canada, IBSU SCIENTIFIC JOURNAL of Georgia, Scientific Journals International (SJI) of USA, Computer Science Journals of Malaysia etc. He is recipient of many awards like Engineer of the Year Award 2011, Young Engineer Award 2008, Young Scientist Award 2005, IEI Expert Engineer Award 2007, nominated for ISCA Young Scientist Award 2006 and awarded Deshbandhu Merit Scholarship for 05 years. He has been selected as Distinguished IEEE Lecturer in IEEE India council for Bombay section. Dr. G.R.Sinha is Vice President of Computer Society of India for Bhilai Chapter. He has delivered many keynote speeches and chaired many technical sessions in international conferences in SINGAPORE, Mumbai, Nagpur and across the country. He is member of signal processing society of IEEE, IACSIT and also of many national professional bodies like IETE, ISTE, CSI, ISCA, and IEI.

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Plenary Lecture 3

Engineering complex information systems for monitoring health and the environment

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Abstract: Much of the progress in engineering will stem from our ability to design complex system out of small components and sensors. Whereas the last successful forty years of microelectronics were tied to our ability of crafting complex integrated circuits out of a myriad of transistors, future systems will exploit nanodevices to realize innovative computational fabrics whose applications require broader hardware abstractions, extended software layers and with a much higher complexity level overall. This talk will address the design of complex information systems that gather and process large amounts of data for bio-medical and environmental monitoring applications.

Brief Biography of the Speaker: Giovanni De Micheli is Professor and Director of the Institute of Electrical Engineering and of the Integrated Systems Centre at EPF Lausanne, Switzerland. He is program leader of the Nano-Tera.ch program. Previously, he was Professor of Electrical Engineering at Stanford University.He holds a Nuclear Engineer degree (Politecnico di Milano, 1979), a M.S. and a Ph.D. degree in Electrical Engineering and Computer Science (University of California at Berkeley, 1980 and 1983).
Prof. De Micheli is a Fellow of ACM and IEEE and a member of the Academia Europaea. His research interests include several aspects of design technologies for integrated circuits and systems, such as synthesis for emerging technologies, networks on chips and 3D integration. He is also interested in heterogeneous platform design including electrical components and biosensors, as well as in data processing of biomedical information. He is author of: Synthesis and Optimization of Digital Circuits, McGraw-Hill, 1994, co-author and/or co-editor of eight other books and of over 450 technical articles. His citation h-index is 70 according to Google Scholar. He is member of the Scientific Advisory Board of IMEC and STMicroelectronics.
Prof. De Micheli is the recipient of the 2003 IEEE Emanuel Piore Award for contributions to computer-aided synthesis of digital systems. He received also the Golden Jubilee Medal for outstanding contributions to the IEEE CAS Society in 2000, the D. Pederson Award for the best paper on the IEEE Transactions on CAD/ICAS in 1987, and several Best Paper Awards, including DAC (1983 and 1993), DATE (2005) and Nanoarch (2010).
He has been serving IEEE in several capacities, namely: Division 1 Director (2008-9), co-founder and President Elect of the IEEE Council on EDA (2005-7), President of the IEEE CAS Society (2003), Editor in Chief of the IEEE Transactions on CAD/ICAS (1987-2001). He has been Chair of several conferences, including DATE (2010), pHealth (2006), VLSI SOC (2006), DAC (2000) and ICCD (1989). He is a founding member of the ALaRI institute at Universita' della Svizzera Italiana (USI), in Lugano, Switzerland, where he is currently scientific counselor.

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Plenary Lecture 4

Conjugation of Artificial Neural Network and Geostatistics Approaches for Groundwater Modeling

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Abstract: Beyond the shadow of a doubt, groundwater is the most important component of the hydrologic cycle and also an important source of water especially in the arid and semi-aired regions. Therefore, modeling and simulation of the accessible resources of groundwater in terms of both quality and quantity is a challenge for the hydrologists and multifarious models have been presented in the technical literature.
In this paper, a two-stage hybrid model is presented for time-space modeling of groundwater level and salinity concentration of a groundwater system based on Artificial Neural Network (ANN) and Geostatistics concepts. At the first stage,an integrated ANN is trained for all piezometers of the study area for time series modeling of the water level considering the spatial relationship among the piezometers. At the second stage, the predicted values of water levels at different piezometers are imposed to a calibrated Geostatistics model in order to estimate groundwater level and salinity at any desired point within the plain. In the second stage in addition to the Kriging scheme, multivariate Co-Kriging approach is also employed to find an appropriate spatial relation between the groundwater level as the primary variable and the salinity concentration of the groundwater as the secondary variable.
The proposed methodology is applied to the cost of the Urmieh Lake which is the largest lake in the middle-east and the second most hyper saline lake in the world. Due to the current drought and also mismanagement of surface water sources, the lake is drying up and creates several hydro-environmental, agricultural and economic problems for the northwest of Iran. Since the lake is the most important source of water discharge to the region'saquifers, this problem has also a direct impact on the groundwater level and salinity.

Brief Biography of the Speaker: Vahid Nourani was born in Tabriz, Iran in 1975 and received his B.Sc. and M.S. degrees in Civil Engineering from University of Tabriz, Iran in 1998 and 2000, respectively. He then continued his graduate study in Civil and Environmental Engineering in the field of Hydrology at Shiraz University, Iran and Tohoku University, Japan and was graduated in 2005. Nourani was with the Faculty of Civil Engineering, University of Tabriz as an Assistant Professor from 2005-2009; as Associate Professor from 2009-2011 and withDept. of Civil Eng., University of Minnesota, USA at 2011 and in this period, 35 Ph.D. and M.Sc. students were graduated under his technical supervision. His research interests include rainfall-runoff modeling,ArtificialIntelligence applications to water resources engineering,Hydroinformatics and computational hydraulics. His researches outcomes have been published as 34 Journal articles, 1 book, 2 book chapters and more than 45 papers presented in international and national conferences. He is currently researching about Geostatistics and 2-D wavelet transform applications to hydrological simulations.

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Plenary Lecture 5

Artificial Bee Colony (ABC) Algorithm Exploitation and Exploration Balance

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Abstract: Many heuristic algorithms were developed to find suboptimal solutions to hard optimization problems. Algorithms based on swarm intelligence represent an important branch of such metaheuristics. Artificial bee colony optimization algorithm is a recent addition to swarm intelligence algorithms that was successfully used on many different hard optimization problems, especially constrained optimization problems. All nature inspired algorithms simulate various natural phenomena. In the case of honey bees the algorithm mimics food foraging of bees with employed bees, onlooker bees and scout bees. In essence, all these diverse mimicking tries to accomplish two things: to exploit good found solutions (exploitation), but also go to unknown places (exploration) in order to avoid being trapped in local minima. The successfulness of any such nature inspired algorithm is determined by proper balance between exploitation and exploration. This balance is maintained by adjusting certain parameters and also by applying some rules in certain situations.
In general, employed bees and onlookers in the ABC algorithm perform exploitation while scout bees perform exploration. However, better results are achieved by fine tuning of the algorithm that introduces some exploration into exploitation phase and vice versa. This plenary lecture will demonstrate few successful examples of such exploitation/exploration balance adjustments for the artificial bee colony algorithm applied to constrained optimization problems.

Brief Biography of the Speaker: Milan Tuba received B. S. in Mathematics, M. S. in Mathematics, M. S. in Computer Science, M. Ph. in Computer Science, Ph. D. in Computer Science from University of Belgrade and New York University. From 1983 to 1994 he was in the U.S.A. first as a graduate student and teaching and research assistant at Vanderbilt University in Nashville and Courant Institute of Mathematical Sciences, New York University and later as an Assistant Professor of Electrical Engineering at Cooper Union Graduate School of Engineering, New York. During that time he was the founder and director of Microprocessor Lab and VLSI Lab, leader of scientific projects and supervisor of many theses. From 1994 he was Assistant professor of Computer Science and Director of Computer Center at University of Belgrade, from 2001 Associate Professor, Faculty of Mathematics, and from 2004 also a Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade. He was teaching more than 20 graduate and undergraduate courses, from VLSI Design and Computer Architecture to Computer Networks, Operating Systems, Image Processing, Calculus and Queuing Theory. His research interest includes mathematical, queuing theory and heuristic optimizations applied to computer networks, image processing and combinatorial problems. He is the author of more than 130 scientific papers and a monograph. He is coeditor or member of the editorial board or scientific committee of number of scientific journals and conferences. Member of the ACM since 1983, IEEE 1984, New York Academy of Sciences 1987, AMS 1995, SIAM 2009.

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