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Recent Advances in
Applied Computer Science & Digital Services

⬤ *Proceedings of the 13ᵗʰ International Conference on*
Applied Computer Science (ACS '13)

⬤ *Proceedings of the 2ⁿᵈ International Conference on*
Digital Services, Internet and Applications (DSIA '13)

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Morioka City, Iwate, Japan, April 23-25, 2013

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Published by WSEAS Press
www.wseas.org

All papers of the present volume were peer reviewed by no less that two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

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Plenary Lecture 1

Rational Biomimetic Drug Discovery; A Computer-Aided Drug Design Based on μ and ω Conotoxins

Professor Babak Khalili Hadad
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Abstract: Cone snail toxins called Conotoxins; function as selective modulators of voltage-gated channels. These peptides act selectively at a wide range of G-protein coupled receptors, cell membranes transporters and ion channels. This potential makes them great interest for protein based rational drug synthesis. Malfunction of voltage-gated channels which have electrophysiological importance associated with some neuromuscular and cardiovascular diseases including epilepsy and long QT syndrome. Consequently development of drugs based on Conotoxins can be helpful for treatment. The subtypes Voltage-gated sodium channels (VGSCs) are classified to Nav1.1 to Nav1.9 based on their inhibition by toxins which can control the influx of sodium ions. They have different physiologic roles e.g. Nav1.3, -1.7, -1.8, and -1.9 are involved in pain pathways. μ-conotoxins and ω-conotoxins, are two common standard drugs in neuroscience researches. The μ-conotoxins immobilize the skeletal muscles without affecting axonal or synaptic events. This family has the ability to block the muscle Na+ channel, Nav1.4. Axonal Na+ channels, Nav1.1– Nav1.3 and Nav1.6– Nav1.9 are not affected. The ω-conotoxins are used as reagents in voltage-gated calcium (Ca2+) channel and block neurotransmitter release. ω-conotoxins have also been used to diagnose the Ca2+ channel targeted disease, Lambert-Eaton myasthenic syndrome. In present study, some structures as inhibitor and modulator, based on conotoxins are suggested. To reach the new dugs the first task is to select a target protein. It is important to introduce the molecular biochemical function, completely. Having some chemicals with natural sources and known function will lead us to find more effective drugs, suitable to bind the protein tightly and be easy to synthesis or modification. To have real bio-accessibility, specificity and fewer side effects are considerable also. The steric and physicochemical complementarity of the binding site of protein and the protein based drug molecule is important. The extent of the evolutionary changes cause, the recognition of homology or orthology among proteins to be difficult, but it is helpful to expect on the sequence, structure and function level. Structural based drug design, molecular dynamics, ONIOM, QSAR as well as docking are the common tools to follow the processes. These aspects include the evaluation of affinity/specificity, hydrophilicity / lipophilicity, distribution, absorption, electrophilic, nucleophilic, and radical attack, biotransformation, which are discussed in this lecture, respectively. Most of these aspects could be performed initially using computational tools. In this presentation bioinformatics methods to predict the protein structure are described and their use towards the drug design is discussed.

Brief Biography of the Speaker: Babak Khalili Hadad graduated from Azad University- Sciences and Research Branch in Biochemistry, where he has started to combine Biomedical sciences with Bioinformatics to explain the mechanism of some diseases. Computer-aided drug design and delivery, docking and ligand- target protein interaction are among his interests. Before that he had graduated in Msc. degree of Clinical and applied Biochemistry from Kerman University of Medical Sciences, and B.Sc. of Cell and Molecular Biology, from Shiraz University of Sciences. He has started to teach Biochemistry (Advanced animal & plant metabolism, Control of metabolism, Pure and Clinical Enzymology, Clinical biochemistry, Bioinformatics) and Molecular biology since 1998. He has been in the organizing committee of some Bioinformatics congresses up to now and also, the editorial board member of American Journal of Bioinformatics Research. He has also been awarded several times as Top university professor and Top researcher. His research interests in Azad University, Faculty of Sciences - Roudehen Branch focus on Biochemical aspects of Bone diseases, specially, Heterotopic ossification and Scoliosis, Blood disorders and Hormonal malfunctions. He has 17 published papers and 3 submitted as well as 16 presentations in national and international congresses.

Plenary Lecture 2

Image Enhancement Methods for Improving the Performance of Conventional Face Recognition Systems

Professor Hector Perez-Meana
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Abstract: The performance of many biometric pattern recognition schemes strongly depends on the image quality used during the identification or recognition tasks. Thus several algorithms have been proposed for image enhancement that can be used as a preprocessing stage of previously developed algorithms in order to improve its recognition performance. Such enhancement methods can be classified in: Methods that modify a pixel value independently of the values of its neighbors, methods based the retinex theory and methods that modify the image histogram. The methods included in the first group such as the gamma piecewise correction modify the pixel value independently of its neighbors. These methods have low computational complexity, although their performance is not always good enough. The methods based on the retinex theory assume that the image cam be represented as the product of illumination and reflectance which are independently processes and then recombined to synthesize the enhanced image. Finally the methods base on the histogram modification, modified the distribution of pixels value in such way that the distribution values processed image produced a higher quality image with better contrast. Because the performance of a biometric pattern recognition system can be significantly improved if reasonable good quality the images can be used during the recognition task, several efficient algorithms hav been proposed during the last few years which improve the performance of the conventional methods. In this talk, a review of the classical and recently image enhancement methods is presented together with an evaluation regarding the improvement of the recognition performance that can be obtained when each of them is used together with a conventional face recognition system.

Brief Biography of the Speaker: Hector Perez-Meana received his M.S: Degree on Electrical Engineering from the Electro-Communications University of Tokyo Japan in 1986 and his Ph. D. degree in Electrical Engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1989. From March 1989 to September 1991, he was a visiting researcher at Fujitsu Laboratories Ltd, Kawasaki, Japan. From September 1991 to February 1997 he was with the Electrical Engineering Department of the Metropolitan University of Mexico City where he was a Professor. In February 1997, he joined the Graduate Studies and Research Section of The Mechanical and Electrical Engineering School, Culhuacan Campus, of the National Polytechnic Institute of Mexico, where he is now The Dean. In 1991 he received the IEICE excellent Paper Award, and in 2000 the IPN Research Award and the IPN Research Diploma. In 1998 he was Co-Chair of the ISITA'98, and in 2009 he was General Chair of The IEEE Midwest Symposium on Circuit and Systems (MWSCAS). Prof. Perez-Meana has published more that 100 papers and two books. He also has directed 17 PhD theses and more than 35 Master theses. He is a Senior member of the IEEE, member of The IEICE, The Mexican Researcher System and The Mexican Academy of Science. His principal research interests are adaptive systems, image processing, pattern recognition watermarking and related fields.

Plenary Lecture 3

Digital Image Authentication Methods

Professor Mariko Nakano-Miyatake
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Abstract: Nowadays a huge amount of digital images, with or without commercial value, are easily shared among the general public via Internet or stored using any of the several available digital formats. Such images which include private pictures or confidential images have in general high quality and may be used as important evidences of some accidents, illegal or criminal acts, etc. In general, such images can be easily manipulated using very efficient tools producing images that look natural enough, without any perceptible visual artifact, such that they can be easily assumed as authentic. Considering that these modifications may destroy important legal evidence or cause important economical or moral damages, efficient authentication techniques for digital images are required. Different image-authentication techniques have been proposed, which can be sorted into two types: watermarking-based and image hashing-based schemes, both of them with advantages as well as some drawbacks. Watermarking-based techniques insert an imperceptible signal into the image to be authenticated to create a watermarked image. The embedded signal can be a random signal or a signal related to the image to be authenticated. During the authentication process, the watermark is extracted from the watermarked image to be utilized for authentication, or even to restore the tampered image. The watermarking-based scheme performs fairly well and even allowing in some cases to restore the tampered image, although in some cases it may introduce some perceptible distortion in the image to be authenticated. The developing of efficient watermarking algorithms have been a topic of active research and several high-performance methods for embedding information into digital images have appeared in the literature. Otherwise the image hashing-based techniques, also called as multimedia fingerprinting, take out a set of robust features from the image to be authenticated to create a compact code, which is stored or transmitted separately, to be used for authentication. During the authentication process, this code is extracted from the image under analysis employing the same method used to estimate the stored or transmitted authentication code, which is then compared with the code extracted from the suspicious image and if the difference between both codes is smaller than a given threshold, the suspicious image is considered as authentic; otherwise, it is determined as a tampered image. So in the image hashing-based technique, the authentication code (hash code) must satisfy the following conditions: first the authentication code and the code extracted from the suspicious image must be quite similar if both images are perceptually similar, while the codes extracted from perceptually different images must be quite different. The second condition is that the authentication code must be as compact as possible, because it is necessary to reduce the storage space or transmission bandwidth caused by the authentication code. It is necessary to point out that the hashing technique or multimedia fingerprinting is different from the cryptographic hashing as in the last one, any change in the image to be authenticated, even if it is perceptually similar to the original one, produces a quite different hash value. In this talk is presented a review of some successful image watermarking-based and perceptual-hashing based image authentication schemes with tamper detection capability.

Brief Biography of the Speaker: Mariko Nakano-Miyatake received the M.E. degree in Electrical Engineering from the University of Electro-Communications, Tokyo Japan in 1985, and her Ph. D in Electrical Engineering from The Universidad Autonoma Metropolitana (UAM), Mexico City, in 1998. From July 1992 to February 1997 she was a Department of Electrical Engineering of the UAM Mexico. In February 1997, she joined the Graduate Department of The Mechanical and Electrical Engineering School of The National Polytechnic Institute of Mexico, where she is now a Professor. Her research interests are in information security, image processing, pattern recognition and related field. Dr. Nakano is a member of the IEEE, RISP and the National Researchers System of Mexico.

Plenary Lecture 4

Cloud Computing with Special Emphases to Intelligent Robotics and Education

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Abstract: Cloud Computing as an emerging technology is a new paradigm in Information Technology and has dramatically changed our everyday life. The presentation summarizes the basics of cloud computing, namely the main idea, the definition, the cloud model composed of essential characteristics, service models and deployment models. In the second part of the presentation the possible applications of cloud computing in robotics are outlined with special emphases to robots as a service in cloud computing. Finally some cloud robotics projects are discussed.
In the third part of the presentation the new perspectives of cloud computing based education are discussed. Some higher educational institutions do not have sufficient hardware or software to provide the students full learning environment and experience. This problem is particularly important in various fields of Engineering Education. Cloud computing provides Service as a Service (SaaS) and Infrastructure as a Service (IaaS) which allow the students to access the latest technologies with a low budget. Finally some tips for planning Platform as a Service (PaaS), SaaS and Iaas are outlined and some security problems are discussed.

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.

Plenary Lecture 5

Public Participatory Decision Making

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Abstract: Within the realm of e-government, the development has moved towards testing new means for democratic decision-making, like e-panels, electronic discussion forums, and polls. Although such new developments seem promising, they are not problem free, and the outcomes are seldom used in the subsequent formal political procedures. Nevertheless, process models offer promising potential when it comes to structuring and supporting transparency of decision processes in order to facilitate the integration of the public into decision-making procedures in a reasonable and manageable way. Based on real-life cases of urban planning processes in Sweden, we present an outline for an integrated framework for public decision making to: a) provide tools for citizens to organize discussion and create opinions; b) enable governments, authorities, and institutions to better analyse these opinions; and c) enable governments to account for this information in planning and societal decision making by employing a process model for structured public decision making.

Brief Biography of the Speaker: Love Ekenberg has a PhD in Computer and Systems Sciences as well as a PhD in Mathematics from Stockholm University. He is full Professor in Computer and Systems Sciences at Stockholm University visiting and Professor in Societal Planning and Environment at KTH - the Royal Institute of Technology. He has been working with various aspects of risk and decision analysis for a number of years and was formerly an advisor to the Swedish Ministry of Foreign Affairs, Centre International de Déminage Humanitaire Genève, member of the Swedish advisory group to the UN ICT Task Force, WHO, World Bank and others. He has published well over 150 articles on formal methods, risk, decision analysis and eGovernment.

Plenary Lecture 6

Botswana Speaks! A Technological and Sociocultural Symbiosis Augmenting Political Discourse

Professor Vasilis Koulolias
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Abstract: In a continuous effort to enhance participation and direct communication between citizens and their elected Members of Parliament (MPs), the Botswana SpeaksParliamentary Initiative is an eDemocracy project that will enable citizens, traditional leaders and local kgotla assemblies in four constituencies of Botswana (Nata/Gweta, Boteti North, South East South and Maun West) to share their views and policy concerns with their elected representative. BotswanaSpeaks is an ICT-based Parliamentary Communication System (PCS) aligned to topical socio-cultural political traditions aiming to enable governments toimprove parliamentary efficiency, increase policy responsiveness and expandgood governance through the use of Information and Communication Technologies (ICT). Moreover, it will enable the MPs to better fulfil their function as policy makers and representatives in the broader objective of achieving wider societal development goals.

Brief Biography of the Speaker: Vasilis is the Director and founder of eGovlab based in Sweden, at Stockholm University, Department of Computer Science. eGovlab is a unique laboratory focusing on eGovernment and citizen service delivery. It is based on a private public partnership. He has dedicated over two decades in bringing the benefits of ICT to popular democratic proceedings while bridging the gap between citizens and policy makers. Until recently, he was the Executive Director of Gov2u, which now serves as Chairman of the Board. Under his direction, Gov2U was placed by PoliticsOnline amongst the Top 10 most influential players in the field of Politics and the Internet. Gov2u is based in Brussels, Belgium and operates in Europe, Africa, North and South America advising and assisting to over 30 governments on how to modernize their policy development processes and enabling citizens to exercise their rights to democratic participation. Vasilis is a member of the International Council for Information Technology in Government Administration (ICA), a non-profit organisation comprised of National Government CIOs. Before founding Gov2U, Vasilis served as the Executive Director of access2democracy and has served in several Boards and Executive management teams in the IT Industry. In 1987 he established Pythia Corp developer of legislative information systems which he ran as Chairman and CEO until the company was sold in 1998. He was a finalist in the 1996 Entrepreneur of theYear Award, Indiana Growth 100, and received the Highest Impacting Partner Award from Microsoft. He has been featured in several books and publications including "Business@the Speed of Thought" by Bill Gates. Prior to establishing PYTHIA he was an Economic Advisor at the Indiana Legislature and Transportation Planner at the Indiana Transportation Planning Board. Vasilis is an Economist and Political Scientist (International Relations) from Indiana University.

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