TELECOMMUNICATION SYSTEMS AND INFORMATICS

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TELECOMMUNICATION SYSTEMS & INFORMATICS

PROCEEDINGS OF THE 8TH WSEAS INTERNATIONAL CONFERENCE ON
TELECOMMUNICATIONS AND INFORMATICS (TELE-INFO '09)

ISTANBUL, TURKEY, MAY 30 - JUNE 1, 2009

ELECTRICAL AND COMPUTER ENGINEERING SERIES
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Preface

This year the 8th Wseas international conference on telecommunications and informatics (TELE-INFO '09) was held in Istanbul, Turkey. The Conference remains faithful to its original idea of providing a platform to discuss microwave theory and techniques, cad design for microwave systems, antennas and radars, lightwave technology, submillimeter-wave techniques, microwave high-power techniques, microwave and millimeter-wave integrated circuits, microwave and millimeter-wave integrated solid state devices, microwave acoustics, filter and passive components 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

An Information Flow based Model of Representation for Developing Informatics as an Academic Discipline

Professor Junkang Feng
Guest Professor, Donghua University,
CHINA
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Dr. Yang Wang
University of the West of Scotland,
UK

Abstract: In informatics and information systems, a fundamental notion is representation. And yet, it would seem that in the literature of information systems this notion has been taken as self-evident and therefore treated largely intuitively, and in particular, how a possible representational relationship between two systems may be systematically identified and formalized has not been fully addressed. We believe that a mathematical model of representation helps develop informatics as a proper academic discipline. We observe that the notion of representation is formalizable. This is because it is information flow channels that underpin representational relationships between systems. We propose an information flow based model whereby to capture, formalize, analyze and reason about representation for distributed systems. We draw on semantic information theories, which not only lay solid philosophical foundations, but also contribute to forming a mathematical foundation for the model. Regularities is taken as a fundamental principle based upon which an information flow channel is constructed in which both tokens and types of a classification are taken into consideration. We introduce the notion of representation link, which connects classifications (contexts in FCA) through type level constraints and token level connections. Our model enables an analysis of information flow within a distributed system both qualitatively and quantitatively. The channel hierarchy and link hierarchy take into account background information, which enhances inference on representation links. The model allows agents to choose a channel that is the most appropriate for their purposes without violating the objectivity of information flow.

This model is then applied to the problem of semantic interoperability. A semantic integration model is thus built. The process of semantic integration is examined by using the mathematical mechanism of the model. The validity of the model is verified by analyzing results of semantic integration from both content and quantity perspectives, and also by showing that the notion of channel and representation link hierarchy involved in our model helps reason over different but relevant integrations.

Brief Biography of the Speaker: Junkang Feng PhD was born in Shanghai China and studied at the Shanghai High School in Shanghai and then graduated from the Institute of Military Engineering of the People's Libration Army (PLA). In China, he lectured at the National University of Defense Technology of the PLA and then worked in a research institute under the Shanghai Academy of Spaceflight Technology. In the UK, he received his MPhil from the University of Portsmouth and PhD from the University of the West of Scotland (the UWS) in Computer Science and Information Systems. He was a Research Associate in the Department of Computer Science at the University of Manchester before became a Lecturer and then Senior Lecturer at the UWS. He established and leads the Database Research Group of the UWS. He is also a Guest Professor and Director of Information Systems Research Institute of Donghua University in Shanghai China, and a Part Time Professor of Beijing Union University Beijing China. His interests include qualitative information and information flow theories, distributed information systems, and database theory and systems, and has published widely in journals, conferences and books in these fields.

Plenary Lecture 2

Statistical Performance Analysis of Communications Channels in Real-Time

Professor Stamatios Kartalopoulos
Williams Professor in Telecommunications Networking
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USA
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Abstract: Measuring the performance of communication channels is very critical for service availability, service performance sustainability, as well as quality of service in telecommunication Networks. One of the key metrics is the Bit Error Performance (BER), which is measured using complex and expensive instruments, and bit error detecting correcting codes (EDC) embedded in the signal of the information channel. However, EDCs are although indispensable for their bit error correcting ability, require many frames of information to provide a good statistical BER value for each channel.

In this lecture, we describe a statistical analytical method based on which we estimate synchronously the performance parameters of all incoming communication channels in microseconds and thus in real-time. This method provides estimation of BER, SNR, NF, Q, and min-max signal levels of current and previous values. In addition, we describe the realization of the method with a simple CMOS circuit. We also describe the benefits of the method and compare with well-established methods.

Brief Biography of the Speaker: Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking at the University of Oklahoma. His research emphasis is on optical communication networks (FSO, long haul and FTTH), optical technology including optical metamaterials, and optical communications security including quantum cryptography and key distribution. Prior to this, he was with Bell Laboratories where he defined, led and managed research and development teams in the areas of DWDM networks, SONET/SDH and ATM, Cross-connects, Switching, Transmission and Access systems. He has received the President's Award and many awards of Excellence.

He holds nineteen patents in communications networks, and has published more than hundred fifty scientific papers, nine reference textbooks important in advanced fiber optic communications and security, and has also contributed several chapters to other books.

He has been an IEEE and a Lucent Technologies Distinguished Lecturer and has lectured at international Universities, at NASA and conferences. He has been keynote speaker of major international conferences, has moderated executive forums, has been a panelist of interdisciplinary panels, and has organized symposia, workshops and sessions at major international communications conferences.

Dr Kartalopoulos is an IEEE Fellow, chair and founder of the IEEE ComSoc Communications & Information Security Technical Committee, member at large of IEEE New Technologies Directions Committee, and has served editor-in-chief of IEEE Press, chair of ComSoc Emerging Technologies and of SPCE Technical Committees, Area-editor of IEEE Communications Magazine/Optical Communications, member of IEEE PSPB, and VP of IEEE Computational Intelligence Society.

Plenary Lecture 3

An Information Flow based Model of Representation for Developing Informatics as an Academic Discipline

Professor Ioan-Gheorghe Ratiu
Department of Mathematics,
"George Baritiu" University
Brasov, ROMANIA
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Abstract: We present a new approach for solving the optimal power flow problem. In this approach we propose to use fuzzy logic techniques to dynamically control parameter settings of genetic algorithms (GA's).
This framework allows one to qualitatively express GA control strategies based on experience or intuition. To make Dynamic Parametric GA's accessible to everybody; we have also presented an automatic fuzzy design technique, which is based on GA's. This technique was in turn used to design an optimal fuzzy system for GA control. The result was a Dynamic Parametric GA controlled by a fuzzy system that exhibited better performance than a simple static GA. This Dynamic Parametric GA was then evaluated on different cases for the economic dispatch and without additional optimization it out-performed a simple static GA. This indicates that the rules found by the automatic design technique may be universally applicable to control GA's in other optimization tasks. In addition, because the representation of control knowledge is based on a fuzzy rule base, knowledge about GA control can be easily extracted after optimization.
We would also like to point out that using the meta-level GA to find the optimized fuzzy system for the dynamic parameterized GA did consume many hours of computation time. However, because the performance of the final system transferred to another task or system without additional tuning may suggest that if good knowledge-base were found, then optimizing the fuzzy knowledge-based system for the dynamic parameterized GA need not be performed very often. The performance of our method demonstrated through its evaluation on the number – bus power system. The test results have shown the proposed genetic algorithm can provide better solutions than the simple static genetic algorithm.

Brief Biography of the Speaker: Academic Positions:

 * Assistant Professor, Department of Mathematics, Informatics and Socio-Human Sciences, Faculty of Economic Sciences, Head of the Information Technology & Communication Department at "George Baritiu" University of Brasov, Romania, where, since 2006, he has held several academic positions.
 *

 He has experience in Information Technology & Communication, Informatics & ECDL, Office Automation, Databases, Radiolocation, and Education.

Scientific activity:

 * He has published a total of 5 books (2 books abroad), has participated in 4 national research projects, has published 49 various papers in conference proceedings or refereed journals (22 papers have been published abroad), has participated with 8 papers at the WSEAS Conferences, has published 6 articles in WSEAS Transactions, and he is a reviewer of WSEAS.
 * He is member of the RoCHI – SIGCHI, Romanian Special Interest Group in Computer-Human Interaction – a local chapter of ACM SIGCHI in Romania (Association for Computing Machinery – Special Interest Group for Human Computer Interaction).

Studies:

 * Ph.D. in Automatic Control, "Transilvania" University of Brasov (2006);

* Licensed Officer in Radiolocation, Electrical Engineering, Electro-Mechanics, Electrical Machines and Apparatus, Ministry of Defence (1995); Licensed in Military Sciences, Aviation, Anti-Aircraft Defence and Naval Faculty, Academy for Higher Military Studies of Bucharest (1993); Radiolocation Officer, Anti-Aircraft Artillery, Missiles and Radiolocation Military School for Active Officers of Brasov (1973);

* Licensed in Electrical Machines and Apparatus, Faculty of Mechanics, "Transilvania" University of Brasov (1981);

Experience:

* Licensed in Electrical Machines and Apparatus, Faculty of Mechanics, "Transilvania" University of Brasov (1981);

* Commandant, Deputy Commandant for Education, Chief of Education Department, Chief Bureau, Chief of the Combat Training Bureau, Chief lecturer of the Combat Tactics and Applications Department, Lecturer of the Electronics and Radiolocation Department of the Air Force Non-commissioned and Technical Non-commissioned Officer School, "Avram Iancu" Radiolocation Military Institute; Anti-Aircraft Artillery and Missiles and Radiolocation Military School for Active Officers of Brasov; Technical Quality Control Service team leader, National General Inspectorate for Product Quality Control, Bucharest (1975 – 2001);

* Radar station team leader, Air Space Surveillance System of the Romanian Air Force (1973 – 1975).

Plenary Lecture 4

Some Interesting Aspects of Elementary Distributions with Applications in Control Algorithms Design

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Professor Monica Leba
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Abstract: This paper presents interesting aspects of classical distributions theory and the elementary distributions, insisting on practical applications in software control of power electronics and digital control engineering. The practical real world phenomena have discontinuities, severe nonlinearities and non-derivation points and therefore cannot be represented as mathematical closed formula. In order to solve this problem using classical mathematics the discontinuous or nonlinear regions are represented using partitioning method in order to eliminate the discontinuities. But this way we eliminate also the use of derivation operator and this is a great disadvantage, because the discontinuity points represent the points where the system is actually working. The distributions theory was years ago only a mathematical theory, never used in practical applications, but the distributions theory with its remarkable properties represents a link between the continuous systems with their vast experience and the digital systems. The development of information technology and control engineering demands the use of distributions theory in order to elaborate the mathematical model. First, the paper presents the definition of elementary distributions and their properties, validated by modeling and simulation. Then, based on the elementary distributions, new properties are introduced, modeled and simulated with digital application examples. The final part of the paper presents complex control engineering applications, like: software oriented digital controllers for power electronics and industrial elevator software controller. All of these controllers algorithms based on distributions theory can be easily coded in any programming language, like microcontrollers, microprocessors or ASIC - HDL embedded solution.

Brief Biography of the Speaker:
Emil Pop: graduated with BSc(Hons) in Electrical Engineering in 1967, graduated with BSc in Mathematics-Informatics in 1976 and gained a PhD in System Control in 1976, based upon the research developed at the University La Sapienza, Rome, Italy and at the University of Petrosani. He joined in 1967 the University of Petrosani. In 1990 became Professor of Control Engineering, Ph.D advisor and was for many years the Head of Control Engineering and Applied Informatics Department. In 1993 he was for 4 years General Director in the Romanian Ministry of Education and Research, from 2004 to 2008 he was Vice-Rector of the University of Petrosani in charge with the R&D and European Programs and from 2008 he is the Rector of the University of Petrosani. In 2001 he was Visiting Professor at the University of Clausthal, Germany. In 2007 he was made Academician of the Technical Academy of Ukraine. He attended several post graduate courses in software development, software engineering, control engineering, curriculum development, education management etc at Reding, Cardiff - U.K., Katowice – Poland, Upsala University - Sweden, Geneva – Switzerland, Toronto – Canada. His general research interests are in system control engineering, nonlinear systems, VLSI system design, robot control, modelling and simulation and applied informatics. In his over 40 years long didactical and research activity he coordinated about 100 national and international research projects and grants and published about 200 papers, from which 8 in WSEAS conferences. He also was a Plenary Speaker at WSEAS conference in Corfu, Greece, October, 2008.

Monica Leba: received a BSc(Hons) in System Control and Applied Informatics Engineering in 1998, a MSc in Information Systems and Technologies in 2007 and gained a PhD in System Control in 2002. She joined in 1999 the University of Petrosani. In 2008 became Associated Professor of System Control Engineering. She is Director of European Programs Centre of the University of Petrosani from 2008 and in the period 2006-2008 coordinated the Erasmus Programs. In 2001 she achieved a research project at the University of Clausthal, Germany and in 2006 at the University of Florence, Italy. She was Invited Lecturer at the University of Clausthal – Germany, University of Nancy – France and University of Malaga – Spain. Her general research interests are in applied informatics, system control engineering, robot control, modelling and simulation, computer engineering and control algorithms design. In her 10 years long didactical and research activity she took part and coordinated about 20 national and international research projects and grants and published about 80 papers, from which 8 in WSEAS conferences. She also was a Plenary Speaker at WSEAS conference in Corfu, Greece, October, 2008.

Plenary Lecture 5

New Trends in Access Control for Information Systems

Assistant Professor Tugkan Tuglular
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Gulbahce Koyu, Urla, Izmir, Turkey

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Abstract: The concept of access control relates to permissions and obligations, which are represented by rules in different granularities, and their enforcement achieved by various operating systems, network software/hardware, and applications. Involvement of different technologies, vendors, and standards make it hard to provide a complete solution in access control for information systems. Moreover, access control requirements started to change with the increased development and use of large-scale, distributed, loosely coupled applications, which run on open and complex environments. This talk will reveal long-time existing access control approaches, declare new requirements for access control and present new trends in the access control field.

Brief Biography of the Speaker: Tugkan Tuglular completed his PhD in information security policies at Ege University (Turkey) in 1999. During his PhD, he worked as a research associate at Purdue University (USA) in the COAST Laboratory (currently CERIAS) for 16 months. After a brief period as a teaching associate at Ege University, he became assistant professor at the Izmir Institute of Technology (Turkey) in 2000. He was the CIO of the Izmir Institute of Technology from 2003 until 2007. He has interest and experience in information/network security and in model-based testing and test automation of security software.. Visit http://www.iyte.edu.tr/~tugkantuglular for publications.

Plenary Lecture 6

Music Digital Libraries: Retrieval, Navigation and Dissemination

Professor Dionysios Politis
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Thessaloniki, GR-541 26
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Brief Biography of the Speaker: Dr. Dionysios Politis earned his Ph.D in Computer Science, MSc in Radio Engineering and Telecommunications, and B.Sc. in Physics from the Aristotle University of Thessaloniki. He is also a holder of a Graduate Diploma in Computing Studies from RMIT as a scholar of the Australian Government.
Apart from his academic career in the Department of Informatics of the Aristotle University of Thessaloniki, he had been a scientific collaborator of the Centre of International and European Economic Law in Thessaloniki and participated as EU expert in Computer Law in various projects aiming to enhance the pre-accession route of Bulgaria, FYROM, Romania and Cyprus.
His research focuses on Multimedia Applications, Computer Music and e-Learning, with more than 50 publications in these areas. He has authored, edited and co-edited six books.

Plenary Lecture 7

Digital Signature and Hash Function Irregularity

Professor Milan Tuba
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Abstract: Use of computer networks is expanding in many important areas such as e-government, e-business, e-learning etc. In any such communications network it is crucial to be able to authenticate both the contents and the origin of a message. Digital signatures (based on public key schemas) are used for authentication and ideally they should provide the same guarantees as a handwritten signatures: unforgeability (only the author of a message should be able to sign his name to a message), undeniability (the author of a message should not be able to deny he signed it at a later stage) and authentication (the signature should allow the contents of the message to be authenticated).

In order to provide message authentication the signature must depend on the contents of the message being signed. Two major problems with the public key-based signature schemes are that they are existentially forgeable and if the message is long then the signature will take a long time to compute. To overcome both of these problems hash functions that map a (possibly lengthy) message to a small digest $h(M)$ are used. Among other desirable properties (the length of $h(M)$ should be small, the function h should be a publicly known one-way function, it should destroy algebraic relationships between messages and signatures), an interesting one is that it should be 'collision-resistant', that is it should be difficult to find two messages with the same hash value.

To find a collision the birthday attack is used, which shows that attacker may not need to examine too many messages before he ?nds a collision. If attacker generates random messages and computes their hash values then with probability at least ½ he ?nds a collision after generating ?$2|R|$ messages, where $|R|$ is the total number of possible hash values for the corresponding hash function. The real situation is even worse. In previous estimates it is always assumed that the hash function is regular, meaning that all points in the range have the same number of pre-images under h. If h is not regular, fewer trials are required. Here we examine different types of irregularity of the hash function and the quantitative changes in the required number of trials to find a collision.

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