



ADVANCED TOPICS ON EVOLUTIONARY COMPUTING

Proceedings of the 9th WSEAS International
Conference on EVOLUTIONARY COMPUTING(EC'08).

Hosted and Sponsored by
Technical University of Sofia



Sofia, Bulgaria, May 2-4, 2008

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Preface

This book contains proceedings of the 9th WSEAS International Conference on EVOLUTIONARY COMPUTING (EC'08) which was held in Sofia, Bulgaria, May 2-4, 2008.

The reader can read state-of-the-art academic papers, high quality contributions and some breakthrough works on Evolutionary Computing from all over the world. Nice applications related to European and international industrial projects decorate a truly important panorama not only on Evolutionary Computing, but also on Intelligent Computing in general.

We thank the Technical University of Sofia for the sponsorship and the support. This conference aims to disseminate the latest research and applications in the Evolutionary Computing. The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from <http://www.wseas.org/reports>. Your feedback encourages the society to go ahead as you can see in <http://www.worldses.org/feedback.htm>

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: www.worldses.org/indexes

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in these conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

We are sure that this volume will be source of knowledge and inspiration for other academicians, scholars, advisors and industrial practitioners and will be considered as one more brilliant edition of the WSEAS related with a brilliant conference sponsored by Technical University of Sofia.

ADVANCED TOPICS ON EVOLUTIONARY COMPUTING

Table of Contents

Plenary Lecture I: Use of Intelligent Evolutionary Agents in the Analysis of Genomic Signals <i>Paul Dan Cristea</i>	12
Plenary Lecture II: Some IP Security Issues <i>Zoran Bojkovic</i>	13
An Integrating View on DNA Computing and Membrane Computing <i>Rudolf Freund</i>	15
Optimizing Coverage in a K-Covered and Connected Sensor Network Using Genetic Algorithms <i>Kasım Sinan Yildirim, Tahir Emre Kalayci, Aybars Uğur</i>	21
Advanced genetic operators and techniques - An analysis of dominance & diploidy. reordering operator in a genetic search <i>Anuradha.S Deshpande, Ramesh.B Kelkar</i>	27
Improvement of Genetic Algorithm Performance for Identification of Cultivation Process Models <i>Olympia Roeva</i>	34
Passive Circuit Synthesis using Genetic Algorithms in MATLAB <i>Vladislav Durev, Elissaveta Gadjeva</i>	40
An Application of Genetic Algorithms and Direct Search Methods to Crack Parameters Identification in Electromagnetic Non-destructive Testing <i>Ivaylo Dolapchiev</i>	45
Efficiency of Parallel Genetic Algorithm for Solving N-Queens Problem on Multicomputer Platform <i>Milena Lazarova</i>	51
Comparison of Global Histogram Methods for 2D and 3D Entropy Based Image Segmentation <i>Georgi Petrov, Panayot Iliev, Plamen Tzvetkov</i>	57
The Impact of the Mutation Strategy on the Quality of Solution of Parallel Genetic Algorithms <i>Milena Lazarova, Plamenka Borovska, Shada Mabgar</i>	63
ASM and Evolutionary Algorithm for Economic Optimization of Project Risk Management <i>Emil M. Popa, Ioana Gabriela Marcu</i>	69

Special Session: Applications of Evolutionary Computing in Modeling and Development of Intelligent Systems <i>Organized by: Dana Simian</i>	75
A new co-mutation genetic operator <i>Florin Stoica, Dana Simian, Corina Simian</i>	76
Models for a Multi-Agent System Based on Wasp-Like Behaviour for Distributed Patients Repartition <i>Dana Simian, Florin Stoica, Corina Simian</i>	82
MMAS and ACS for GPS Surveying Problem <i>Stefka Fidanova</i>	87
Plugins architecture for e-learning systems <i>Bogdan Alexandru Brumar, Emil Marin Popa, Iulian Pah</i>	92
Dynamic modeling of the human upper limb <i>Antoanela Naaji</i>	98
Private IP address to name resolution statistics <i>Vesselin Kolev, Stefan Dimitrov, Milena Ivanova</i>	102
Web Document Classification and its Performance Evaluation <i>Ioan Pop</i>	105
Formal Techniques Used In Encrypting Systems <i>Mircea Iosif Neamtu</i>	111
Data Modeling at Conceptual Level. Object-Role Modeling (ORM) <i>Daniel Hunyadi, Mircea Musan</i>	117
One Genetic Algorithm for Hierarchical Covering Location Problem <i>Miroslav Maric, Milan Tuba, Jozef Kratica</i>	122
Free Search in Tracking Time Dependent Optima <i>Kalin Penev</i>	127
Visualization of Free Search Process <i>Erdoan Veliev, Kalin Penev</i>	133
Genetic learning using adaptive action value tables <i>Masaya Yoshikawa, Takeshi Kihira, Hidekazu Terai</i>	136
Fatigue based 3D structural design optimisation implementing genetic algorithms and utilising the generalised Frost-Dugdale crack growth law	142

K. Krishnapillai and R. Jones

Genetic Algorithm based Consequent Parameters determination of Fuzzy-C Regression Model (FCRM) **149**

Sajjad Mohsin, Sadaf Sajjad

Author Index **155**

Join us! AEE 2008 and ELECTROSCIENCE 2008
WSEAS Conferences, Trondheim, Norway, July 2-4, 2008

Keynote Lecture:
Next Generation Broadband Access Networks:
Metro-Access Integration and Optical-Wireless Convergence



Professor Leonid G. Kazovsky
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Professor Ning Cheng
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Abstract: Because of emerging multimedia applications, such as video-on-demand, video conferencing, interactive gaming, IPTV and e-learning, bandwidth demands from end users are constantly increasing. The copper wire technologies (e.g. cable and DSL) bridging users and the Internet have been stretched to their bandwidth limits, and become the so-called first/last mile bottleneck.....

More Details: <http://www.wseas.org/conferences/2008/norway/electro/>

Short Biography of the Speaker: Dr. Leonid G. Kazovsky is a Professor in the Department of Electrical Engineering at Stanford University. He founded Photonics and Networking Research Laboratory (PNRL) at Stanford University in 1990 and has been leading the PNRL since then. Prior to joining Stanford, Prof. Kazovsky was with Bellcore (now Telcordia) doing research on WDM, high-speed and coherent optical fiber communication systems. While on Bellcore assignments or Stanford sabbaticals, Prof. Kazovsky worked at the Heinrich Hertz Institute, Berlin, Germany; Hewlett-Packard Research Laboratories, Bristol, England; Scuola Superiore St. Anna, Pisa, Italy; and Technical University of Eindhoven, the Netherlands. Through research contracts, consulting engagements, and other arrangements, Prof. Kazovsky worked with many industrial companies and U.S. Government agencies including Sprint, DEC, GTE, AT&T, IVP, Lucent, Hitachi, KDD, Furukawa, Fujitsu, Optivision, and Perimeter on the industrial side; and NSF, DARPA, Air Force, Navy, Army, and BMDO on the government side. He also helped to launch several startup companies in the Silicon Valley. He was the author or coauthor of two books, 190 journal technical papers, and 260 conference papers. Prof. Kazovsky serves or served on Editorial Boards of leading journals (IEEE Transactions on Communications, IEEE Photonics Technology Letters, Wireless Networks) and on Program Committees of leading conferences (OFC, CLEO, LEOS, SPIE, and GLOBECOM). He also serves or served as a reviewer for various IEEE and IEE Transactions, Proceedings, and Journals; funding agencies (NSF, OFC, ERC, NRC, etc.) and publishers (Wiley, MacMillan, etc.).

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Heraklion, Crete Island, Greece, July 23-25, 2008
<http://www.wseas.org/conferences/2008/greece/>

Keynote Lecture

Distributed Estimation Using Wireless Sensor Networks



Professor Georgios B. Giannakis
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Abstract: Envisioned applications of wireless sensor networks (WSNs) include surveillance, monitoring and tracking tasks. These motivate well decentralized estimation and smoothing of deterministic and (non)stationary random signals using (possibly correlated) observations collected across distributed sensors. In this talk we present state-of-the-art algorithms for consensus-based distributed estimation using ad hoc WSNs where sensors communicate over single-hop noisy links. The novel framework reformulates basic estimation criteria such as least-squares, maximum-likelihood, maximum a posteriori, and linear mean-square error, as decomposable, constrained, convex optimization problems that are amenable to distributed solutions. The resultant distributed estimators are provably convergent to their centralized counterparts and robust to communication noise. Besides stationary, the framework encompasses adaptive filtering and smoothing of non-stationary signals through distributed LMS and Kalman filtering.

Brief Biography of the Speaker: Prof. G. B. Giannakis received his B.Sc. in 1981 from the Ntl. Tech. Univ. of Athens, Greece and his M.Sc. and Ph.D. in Electrical Engineering in 1983 and 1986 from the Univ. of Southern California. Since 1999 he has been a professor with the Department of Electrical and Computer Engineering at the University of Minnesota, where he now holds an Endowed ADC Chair in Wireless Telecommunications. His general interests span the areas of communications, networking, signal processing, estimation and detection theory -- subjects on which he has published more than 270 journal papers, 450 conference papers, two research monographs and two edited books. Current research focuses on wireless networks, complex-field and space-time coding, ultra-wideband and cognitive radios, cross-layer designs and wireless sensor networks. He is the (co-) recipient of six best paper awards from the IEEE Signal Processing (SP) and Communications Societies (1992, 1998, 2000, 2001, 2003, 2004) and also received the SP Society's Technical Achievement Award in 2000 as well as the EURASIP Technical Achievement Award in 2005. He is an IEEE Fellow since 1997, a Distinguished Lecturer for 2007-08, and has served the IEEE in various editorial and organizational posts.

Plenary Lecture I

Use of Intelligent Evolutionary Agents in the Analysis of Genomic Signals



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Abstract: Surprising regularities in the distribution of nucleotides and pairs of nucleotides along the genomes of both prokaryotes and eukaryotes become evident when converting nucleotide sequences from symbolic to digital form. These regularities make the structure of a genome be less like that of a "plain text", which simply conveys a semantics in accordance to a grammar, and more like that of a "poem", which obeys additional structural rules that give "rhythm" and "rhyme". Direct applications of the rules satisfied by nucleotide sequences are (1) objective evaluation of sequencing process quality, (2) prediction of nucleotides sequences similarly to time series, (3) revealing of genome ancestral structure, (4) analysis of pathogen variability. Intelligent Evolutionary Agents are used to track pathogen variability, specifically to identify drug resistance mutations, without the need of the conventional lengthily and expensive phenotypic clinical studies that request pathogen culture.

Brief Biography of the Speaker: Paul Cristea graduated the Faculty of Electronics and Telecommunications of the University "Politehnica" of Bucharest (UPB) in 1962, the Faculty of Physics of the University of Bucharest in 1969, and got a Ph.D. in Technical Physics in 1970. Since then his research and teaching activities covered an extended area of Electrical Engineering and interdisciplinary domains including topics like Genomic Signals, Digital Signal and Image Processing, Neural and Evolutionary Systems, Evolutionary Intelligent Agents, Intelligent e-Learning Environments, a.o. He is the author or co-author of more than 130 published papers, 11 patents, and has contributed to more than 20 books in these fields. Currently, he is the director of the Bio-Medical Engineering Center of PUB, director of the Romanian Bioinformatics Society, and an associated member of the Romanian Academy.

Plenary Lecture II

Some IP Security Issues



Dr. Zoran Bojkovic

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Senior Member IEEE, WSEAS member, EURASIP member
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Abstract: IP security (IPsec) is a suite of protocols for securing Internet Protocol (IP) communications by authenticating and or encrypting each IP packet in a data stream. IP packets do not have any inherent security. As a result there is no guarantee that a received IP packet is from the claimed sender contains original data that the sender put in it or was not sniffed during transit. IPsec provides a method to protect IP datagrams and is commonly used in Virtual Private Networks (VPNs). It defines a method for specifying the traffic to protect, how that traffic is to be protected and to whom the traffic is sent. From the point of view of multimedia networks, security is important to be recognized for current and future users and implements. In response to IP security issues, Internet Architecture Board (IAB) included authentication and encryption as necessary security features in the next-generation IP, which has been used as IPv6. Fortunately, these security capabilities were designed to be usable both with the current IPv4 and the IPv6. Following an introduction, this presentation begins by introducing Internet Key Exchange (IKE) protocol. The goal of this protocol is to establish and maintain shared security parameters and authenticable keys between the two IPsec end points. For both IPv4 and IPv6 the choice of Encapsulating Security Payload (ESP) protocol and Authentication Header (AH) is offered. The IP ESP provides confidentiality, along with optional (but strongly recommended) authentication and integrity protection. The IP AH provides integrity and authentication and integrity protection.

The next parts of this lecture cover frameworks for basic security concepts and security technology. The IP security architecture uses the concept of a security association as the basis for building security function into IP. A security association is simply the bundle of algorithms and parameters (such as keys) that is being used to encrypt and authenticate a parameter flow in one direction. In bi-directional traffic, the flows are secured by a pair of security associations. Security technology is a term that relates to the technical methods used to realize security requirements (cryptographic mechanisms, hash schemes, key management methods). Next part of this presentation covers infrastructure for future mobile networks because they will be open to different services and service providers. Also, five security features groups (network access security, network domain security, user domain security, application domain security, visibility and configurability of security) are analyzed. Finally, infrastructure security definitions, requirements and security context together with network operator's security requirements, requirements from user's, network's as well as service's perspective are enclosed.

Brief Biography of the Speaker: Zoran S. Bojkovic received the Diploma in electrical engineering and the M.S. and Ph.D. degree all from the Faculty of electrical engineering, University of Belgrade, Serbia. He is a professor of Electrical Engineering at the University of Belgrade. He is the co-author of the books "Introduction to Multimedia Communications" (Wiley 2006), "Multimedia Communications Systems" (Prentice-Hall 2002) and "Packet Video Communications over ATM Networks" (Prentice-Hall 2000), all with prof. K. R. Rao from the University of Texas at Arlington, USA. He has published in international peer-reviewed journals and participated in many scientific and industrial projects. He is Editor-in-chief for the WSEAS Transactions on Communications and WSEAS Transaction Science and Applications. He is IEEE Senior member and EURASIP member.

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