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Latest Advances in Information Science, Circuits & Systems

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- Proceedings of the 13th WSEAS International Conference on Neural Networks (NN '12)
- Proceedings of the 13th WSEAS International Conference on Fuzzy Systems (FS '12)
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Published by WSEAS Press
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ISSN: 1790-5109
ISBN: 978-1-61804-099-2

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Preface

This year the 13th WSEAS International Conference on Neural Networks (NN '12), the 13th WSEAS International Conference on Fuzzy Systems (FS '12), the 13th WSEAS International Conference on Evolutionary Computing (EC '12), the 13th WSEAS International Conference on Automation & Information (ICAI '12) and the 1st International Conference on Circuits, Systems, Communications, Computers and Applications (CSCCA '12) were held at "G. Enescu" University, Iasi, Romania, June 13-15, 2012. The conferences provided a platform to discuss mathematical foundation of neural networks, neural network software, neural networks and neuroscience, neural control, fuzzy logic, fuzzy sets, fuzzy algorithms, fuzzy systems in robotics and mechatronics, evolutionary programming, neuro-fuzzy-evolutionary systems, molecular computing, circuits and systems, mobile communications, computer networks, real time systems, microcircuits, military electronics, systems theory, hybrid systems, microwave theory and techniques, applied electromagnetics, algorithms and theory of computation, network reliability, military communications, intelligent agents 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

Neural Network Synthesis

Professor Pavel Varacha
Department of Informatics and Artificial Intelligence
Faculty of Applied Informatics
Tomas Bata University in Zlin
Czech Republic
E-mail: varacha@fai.utb.cz

Abstract: The lecture describes a feed forward Artificial Neural Network (ANN) synthesis via an Analytic Programming (AP) by means of the ANN creation, learning and optimization. This process encompasses four different fields: Evolutionary Algorithms, Symbolic Regression, ANN and parallel computing to successfully synthetize a suitable ANN within a reasonable time. AP performes well in many separate cases together with different evolutionary algorithms as its “engine”. Direct asynchronous parallelization of SOMA – Self-Organizing Migration Algorithm is applied here to boost AP with unusual efficiency. The ANN synthesis method is applied to the real life problem of Heat Load Prediction function optimization of the heating plant in Komorany (Czech Republic) as well as on cancer classification problem and is compared with other methods. ANN synthesis proved to be a useful and efficient tool for nonlinear modeling and its results were applied to intelligent system controlling an energetic framework of an urban agglomeration.

Brief Biography of the Speaker: Pavel Varacha graduated from Tomas Bata University in Zlin, Czech Republic in 2006. In the same year he has started to work as a lecturer on Faculty of Applied Informatics, Tomas Bata University in Zlin. Pavel Varacha develops innovative methods in the fields of evolutionary computing, parallel computation and artificial neural network optimization.. Since 2006 he frequently publishes articles and software solutions covering his scientific contributions. Between 2006 and 2011 he worked as a researcher on National Research Program II, The intelligent system controlling an energetic framework of an urban agglomeration (successfully finished in 2011). In 2008 he has started to work also in College of Logistics, Prerov, Czech Republic. From 2009 he regularly publishes within WSEAS conferences and journals. Pavel Varacha has acquired Ph.D. title in Information Technology from Tomas Bata University in Zlin (2011). He continues his scientific and pedagogic work on Department of Informatics and Artificial Intelligence, Faculty of Applied Informatics, Tomas Bata University in Zlin. Presently he is a member of WSEAS research project developing unique method of neural network optimization and learning called Neural Network Synthesis.

Plenary Lecture 2

Applications of fuzzy measures

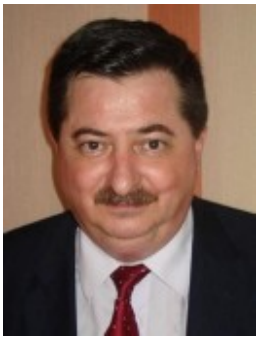
Professor Anca Croitoru
Faculty of Mathematics
"Al. I Cuza" University of Iasi
Romania
E-mail: croitoru@uaic.ro

Abstract: The importance of fuzzy measure theory, founded by Sugeno in 1974, is well known due to its applications for instance in statistics, mathematical finances, human decision making, medicine. Our talk refers to some topics such as fuzzy set-valued integrals and measurable multifunctions.

Brief Biography of the Speaker: Anca Croitoru graduated the Faculty of Mathematics at "Al.I. Cuza" University of Iasi, Romania and received the Doctoral Degree in Mathematics in 2000 at the same university. In present she is lecturer at the Faculty of Mathematics, "Al.I. Cuza" University of Iasi, Romania. She is member of AMS, WSEAS, ROMAI, EWM, ISCB,
"Al. Myller" Mathematical Seminary Foundation of the Faculty of Mathematics at "Al.I. Cuza" University.
She is author or co-author of 6 books (in Romanian), over 40 papers in national or international refereed journals and conference proceedings, co-editor of 7 conference proceedings, participant at over 40 national or international conference and coordinator or member of 4 national and 3 international research projects.
Her research interest includes multimeasures, fuzzyness in measure theory, set-valued integrals, non-additive set multifunctions, continuity and measurability of multifunctions.

Plenary Lecture 3

Enhanced Evolutionary Search Algorithms for Multiobjective Optimization in Power Systems



Professor Mihai Gavrilas
Departmenet of Power Systems
«Gheorghe Asachi» Technical University of Iasi
Romania
E-mail: mgavrilas@yahoo.com

Abstract: The development of electricity networks towards the future smart grids is naturally accompanied by increasing complexity of technical, economical and environmental problems. The new challenges require the development of new techniques and optimization methods, including specific approaches to multiobjective optimization problems.
The presentation will focus on basic and multiobjective optimization methods with application to power system optimization problems. These methods are based on modern Evolutionary Computation (EC) metaheuristics, namely search algorithms based on ordered movement of particles (OMP), such as the Gravitational Search Algorithm (GSA) or the Charged System Search Algorithm (CSSA). As the lecture will emphasize, the performance of these algorithms can be substantially improved using an auxiliary mechanism called “dynamic supervision”, specially designed for escaping from local minima.
At the same time, the increasing number of actors in the electricity industry, along with a more distributed nature of electricity generation and an increasingly active role of consumers in the resource management activities, make the decision making process more and more based on multiobjective approaches. One of the most interesting issues in this context is the optimization problem with conflicting objectives. In this case, beyond the traditional methods such as the weighted sum of objective functions or the bounded objective function, one of the most commonly used technique is based on the principle of Pareto optimality, and can be approached using methods such as Strength Pareto Evolutionary Algorithm (SPEA) or Nondominated Sorting Genetic Algorithm (NSGA). Starting from the principle of Pareto optimality, an original method for handling multiobjective optimization problems using OMP-type search algorithms will be described. The method uses non-dominant sorting and particles clustering based on the rank of the Pareto front where each particle was located.
The implementation of the proposed search algorithms is demonstrated for the case of a classical power systems problem, namely the optimal reactive power compensation or VAR optimization using capacitor banks.

Brief Biography of the Speaker: Mihai Gavrilas was born in Iasi, Romania on February, 6, 1959. He received the M.Sc. degree from the “Gheorghe Asachi” Technical University of Iasi, Romania, in 1984. Between 1984 and 1988 he worked as a field engineer and then as a design engineer in the field of power station and substation building and design. Since 1988 he has been devoted to education and research at the “Gheorghe Asachi” Technical University of Iasi, where, at present, he is a professor with the Power System department, at the faculty of Electrical Engineering. In 1994 he received the Ph D degree in power systems from the Technical University of Iasi. He is reading courses on Power systems steady state and stability analysis, Intelligent systems application in power systems and Electricity markets. He has a remarkable scientific and educational experience being the author or joint author of 11 books, and over 140 papers in the area of power systems and intelligent systems applications, published in international journals and conference proceedings. He also has a valuable project management experience (project manager or member in the research team) in over 40 research grants sponsored by research organizations and / or research programs with partners from industry. He is an IEEE member (Power and Energy Society, Computational Intelligence Society, Systems, Man and Cybernetics Society) since 1994 and a CIGRE member since 2008. His main research interests are directed towards multi-objective optimization for power systems steady-state operating conditions, power systems dynamics and control, state estimation and observability analysis in power systems, and computational intelligence application in power systems. He participated as a Plenary Speaker in the 9-th WSEAS / IASME International Conference on Electric Power Systems, High Voltages, Electric Machines (POWER 2009), Genova, Italy and the 12-th WSEAS International Conference on Mathematical Methods and Computational Techniques in Electrical Engineering (MMACTEE 2010), Timisoara, Romania.

Plenary Lecture 4

Applications of the Concept of Virtual Organization in Military Training

Professor Mircea Boşcoianu
"Henri Coandă" Air Force Academy Braşov
ROMANIA
E-mail: prorector_cercetare@afahc.ro

Abstract: Multi-Agent System (MAS) is defined as a group of agents with specific roles in the organization which work in a synergic way (the global contribution represents more then the summarization of the contribution of the components). In real world there is an interest to be oriented on networks, based on a dynamic and adaptive process of selection of the abilities and capabilities of different actors and then fused in a single entity (chain value concept).
This application is inspired from the distributive business process (DBP) concept which represents a set of dynamic/temporary processes orientated on developing the final product of Virtual Enterprise (VE). The VE is defined (Camarinha-Mathos, Afsarmanessh,1999) as a "temporary alliance that come together to share skills or core competencies and resources in order to better respond to business opportunities, and who's cooperation is supported by computer networks". The key elements are networking and cooperation. A generalized concept of VE is represented by Virtual Organization (VO) which represents collaborative networks of organizations that are not limited by Enterprises.
This application is based on the concept of MAS-VE which is designed and developed by using a proper mechanism to sustain VO based on the cooperation in networks of chain values.
The architecture (the functional structure defined by taking into the elements of the system interface, processes, constrains and behavior) of VO is characterized by a minimal structural definition, but also by the complexity of tasks and restrictions of the processes.
MAS-VO should satisfy a demand with maximal efficiency. The flexibility is expressed by the capability to offer a wide variety of different configurations. More flexibility implies a better management of change by using local decisions and then a parallel dissemination on the whole system.
Military training should consider a multi environment space, in which the virtual component of training should respond to: increased capabilities, embedded and tactical subsystems, joint capabilities. The advantage of a training support infrastructure based on virtual components is expressed by costs, efficiencies, better adaptability, a unique capability of battle staffs to synchronized. The concept of synthetic training environment and embedded training based on virtual training systems support commanders requirements for more efficient training.
In this paper are also presented the emerging possibilities to improve combat skills and leadership formation for military students by using virtual based techniques capable to simulate the complexity of future battle space.

Brief Biography of the Speaker: Mircea Boscoianu born at 29.04.1966 in Suceava, Romania. He is a Romanian citizen that graduated the Faculty of Integrated System of Armament, Aerospace Engineering in the Military Technical Academy of Bucharest (1990) and the Faculty of Cybernetics in the Academy of Economic Studies of Bucharest (1996). His first PhD was in Aerospace Engineering (1993-1999) in Military Technical Academy and the second in Cybernetics and Statistics (2000-2003) in the Academy of Economic Studies of Bucharest.
Since 2009 he is vice-rector of Science at Air Force Academy Brasov.
His research and teaching activities (1990-2009, Military Technical Academy, Dept of Integrated Aeronautical System and Mechanics, 2009-2012 Air Force Academy Brasov) covered an extended area of Aerospace Engineering, Cybernetics, Statistics and interdisciplinary domain like mini and micro, Risk Management, Management of Extreme Risk Events, Soft Computing, Artificial Intelligence . He is author/ co-author of more than 120 published papers and has contributed to more than 15 books in these fields. Mircea Boscoianu has 12 participations in WSEAS Conferences with 20 papers. He was the Head of Saphire-FAI Program (2006-2008) and is member of the Astronautical Commision of the Romanian Academy since 2005.
Mircea Boscoianu has an interesting experience in national projects/ programs (5 projects in CNCSIS 2003,CEEX 2005,SECURITY 2005,PN2 2007 as general manager and many projects as scientifical economical manager).

Plenary Lecture 5

Mathematical studies applied in ball bearings reliability analysis

Professor Constantin Buzatu
Department of Technological Engineering and Industrial Management
Transilvania University of Brasov
ROMANIA
E-mail: cobuzatu@unitbv.ro

Abstract: The evolutions of stresses in mechanical transmissions are not uniform. It was being developed analysis techniques and tests to find the influence of random efforts on the fatigue life. In the paper is presented a mathematical program regarding the evaluating by fatigue using “rainflow” method, of the influence the random stresses on the mechanical parts life.

Brief Biography of the Speaker: Constantin Buzatu is Professor at the Faculty of Technological Engineering and Manufacturing Technology Department of Transilvania University of Brasov, Romania. He graduated in 1972 and he obtained his Ph.D. in the field of accuracy of machining processes. His research interests are in Manufacturing engineering processes, Automation in industry, Performance measurement and management, Education technology. He is author and co-author of seven books and more than 150 papers in national and international conferences. Also he has been research manager for several research grants from Ministry of Education of Romania, and for contracts with factories in industry to introduce new technologies in producing workpieces and to improve their reliability. He was member of technical program committee of some conferences and chairman of local and international conferences. He has been scientific reviewer for International Conferences and independent evaluator for Grant National Competitions.

Plenary Lecture 6

Automatic Face Detection and Recognition Techniques

Dr. Tudor Barbu
Institute of Computer Science of the Romanian Academy
Iasi branch
ROMANIA
E-mail: tudbar@iit.tuiasi.ro

Abstract: Face recognition has become a very popular field of research in computer vision, representing both a pattern recognition and biometric domain. It is preferable to many other biometric technologies because of its non-intrusive character and because it is very easy to use. Thus, facial recognition has a critical role in biometric systems and it is also attractive for numerous applications including visual surveillance, access control, robotics and security systems. Face detection and recognition represent two strongly-correlated computer vision processes. Face detection constitutes the first step for any automatic face recognition system. Although there has been a great amount of progress in face detection and recognition so far, numerous issues remain unsolved. In spite of several decades of extensive research the development of a computer-based artificial facial recognition system having capabilities comparable with those of human vision systems represents an unachieved goal. Research of human face detection has to confront many challenging problems, related to viewpoint, outdoor illumination, posing variation with large rotation angles, low image quality, low resolution, occlusion, and background changes in complex real-life scenes. Artificial face recognition is also quite difficult because of some factors, such as viewpoint, lighting conditions, facial expressions, aging effects and occlusions.
There are several known categories of face detection approaches: knowledge-based techniques, feature-based methods, appearance-based approaches and template matching methods. The template matching techniques have been the most investigated during our research. We proposed novel face detection approaches based on human skin identification. A skin detection algorithm based on explicitly defined regions is applied first, then a correlation-based template-matching process is performed on the detected skin regions. The most popular face recognition techniques include Eigenfaces, Fisherfaces, Linear Discriminant Analysis, Elastic Bunch Graph Matching, Hidden Markov Models, Gabor filtering and Dynamic Link Matching neuronal model. During our research we considered original facial recognition techniques based on Eigenfaces and Gabor filters. Our Eigenface-based approach is based on the influential work of Turk and Pentland, proposed in 1991. A continuous differential model for face fature extraction is provided, then the mathematical model is discretized. The second recognition technique uses Gabor filtering in the feature extraction stage. It applies a set of 2D Gabor filters, at various frequencies, orientations and standard deviations, on the facial images. An automatic supervised classifier is used in both face authentication cases.

Brief Biography of the Speaker: Dr. Tudor Barbu is currently Senior Researcher II at the Institute of Computer Science of the Romanian Academy, Ia?i branch. He is the coordinator of an image and video processing research collective at this institute. Mr. Barbu has a PhD degree in Computer Science, awarded by the Faculty of Automatic Control and Computers of the University “Politehnica” of Bucharest.
He possess a remarkable research profile. In the last decade he published two books and four book chapters as single or main author. Also, dr. Tudor Barbu published more than 60 articles in prestigious international journals and volumes of international scientific events (conferences, symposiums and workshops). His prolific scientific activity also includes more than 30 research reports, elaborated with the institute research team coordinated by him or related to various research projects. His scientific publications have numerous citations, according to Google-Academic.
In recent years he also coordinated various research directions in 6 projects based on contracts/grants. Dr. Tudor Barbu received also several awards for his research results, the most important being the Romanian Academy Prize “Gheorghe Cartianu”, in the Information Science and Technology domain, awarded on December 18, 2008. He is member of several conference scientific committees and also member of scientific and technical committee and editorial review boards of some journals. He is the Editor in Chief of a book. His main scientific areas of interest are: digital media (audio, video and image) signal processing and analysis, pattern recognition, computer vision, multimedia information storage, indexing and retrieval, and biometric authentication using voice, face and digital fingerprint recognition.

Plenary Lecture 7

Grammar-Based System Specification for Fun and Profit

Associate Professor Stefan D. Bruda
Dept. of Computer Science
Bishop's University
Quebec, Canada
E-mail: stefan@bruda.ca

Abstract: The specification of programming languages has long benefited from a powerful system, namely the context-free grammar which allows for a natural language specification and is then "compiled" into an automaton that performs the actual parsing. The same pattern (grammars for specification, automata for implementation) is manifest in the realm of formal methods. Here however tools have been essentially limited to a less powerful formalism; indeed, most process algebrae used in practice for specifying computing systems are just another name for regular grammars, which are considerably less expressive than their context-free counterparts. Using regular grammars thus limits the constructs that can be specified; recursion in particular can only be used in very limited forms, which makes the specification of complex software impossible for all practical purposes. Still, the reason regular grammars continue to be the norm in formal methods is that certain language-theoretic properties show that context-free languages are paradoxically less expressive than regular language in the context of system specification, they being able to model recursion alright, but unable to model other common scenarios such as concurrency. Recently, new tools based on context-free grammars have emerged; such a success remains however in the realm of automata, that is, they do not have any convenient associated "specification language." On-going research is currently attempting to start on the grammatical side, with the eventual goal of creating process algebrae that are capable of handling both recursion and concurrency. In turn, such algebrae will permit complete specifications for complex application software, which today are simply too complex to handle. In this talk I will present the effort of going beyond regular grammars in formal methods. I will summarize the automata side and I will also outline the grammatical approaches. We will see that such an effort is rich and interesting (hence the "fun" in the title) and also has tremendous practical applications (hence the "profit"). On the other hand, we will also see that numerous challenges (both theoretical and practical) have yet to be tackled.

Brief Biography of the Speaker: Dr. Stefan D. Bruda has a successful career as researcher in Computer Science, with over 50 publications so far. His research has spanned at least four major areas (formal languages and automata, formal methods, parallel computation, and artificial intelligence). His main research interest is now formal methods, but he also continues to be interested in formal languages, more precisely in grammatical approaches to parallelism (which will likely be useful in the area of formal methods). Dr. Bruda's research has been continuously funded by a major federal funding agency (the National Science and Engineering Research Council of Canada) since the start of his professional career. His research has also been funded by provincial agencies and other sources. Dr. Bruda acts as an editor for the Parallel Processing Letters journal. He has been active as a reviewer to several conferences, journals (including Theoretical Computer Science and Parallel Processing Letters), and funding agencies (including NSERC in Canada and the CHIST-ERA Consortium in the European Union). He has been invited two times as plenary speaker to international conferences (but had to decline one). Since December 2011 he is a Senior Member of the Association of Computing Machinery (ACM).

Plenary Lecture 8

Collaborative Engineering in Product Development of Virtual Enterprises

Associate Professor Badea Lepadatescu
Transilvania University of Brasov
Faculty of Technological Engineering and Industrial Management
Department of Manufacturing Engineering
Romania
E-mail: lepadatescu@unitbv.ro

Abstract: Collaborative engineering in product development is one of the most important requirements for making this Virtual Enterprise real, competitive, and widely implemented within organizations. Collaborative Engineering is a virtual methodology that tends to bring to upstream knowledge professions involved in downstream design as preparation of manufacture, production and marketing. It involves effective participation of different professions specialists in the earliest stages of conception. Mechatronic Integration technology is playing an increasingly important role in popularizing the concept of end-to-end, cross-functional design. With Mechatronic Integration modules, two engineering departments share program access and intelligence, and become more productive as a consequence.

Brief Biography of the Speaker: Badea Lepadatescu is currently an Associate Professor at the Faculty of Technological Engineering and Industrial Management of Transylvania University of Brasov, Romania. He obtained his doctoral degree in 1998 in the area of machining through superfinishing process. After he graduated he worked five years as design engineer at Roman truck factory in the field of manufacturing processes where he designed many devices and special machine tools especially for superfinishing process. Started on 1982 he worked as research engineer at Transilvania University of Brasov, and after 1997 he is teaching at Department of Manufacturing Engineering. His main academic interests include Tolerance and Dimensional Control, Manufacturing Engineering Processes, Automation Processes, and Renewable Energy Sources. The research accomplishments are reflected through publications in a five books and authored or co-authored over 120 papers published at international conferences. He has extensive experience in both experimental and theoretical research work having more than 50 contracts with factories to design and produce machine tools for machining processes. Also in the field of Renewable Energy Sources together with a team he made two wind turbines, one with horizontal axis for taking water, and one with vertical axis to produce electric energy. He has been speaker to international conferences, has moderated forums, organized symposia, workshops and sessions at major international conferences.

Plenary Lecture 9

Development of Mechanical Sensor based on Flat Coil Element

Professor Mitra Djamal
Theoretical High Energy Physics and Instrumentation Research Group
Faculty of Mathematics and Natural Sciences
Institut Teknologi Bandung (ITB)
Jl. Ganesa 10 Bandung 40132
Indonesia
E-mail: mitra@fi.itb.ac.id

Abstract: Distance is a physical quantity that used in many applications. In the field of sensor, distance is a main physical quantity that can be used for many measurements. In this paper, we will show the use of flat coil element for measuring of very small distance (proximity). Based on this ability, we develop sensors for measuring mechanical quantities such as pressure, vibration and moment of force. As a proximity sensor, the flat coil element is used to measure the position of an object (seismic mass) as a function of time. Its working principle is based on position change of a seismic mass that put in front of a flat coil element. The flat coil is a part of a LC oscillator; therefore the change of seismic mass position will change its resonance frequency. Based on the developed flat coil element, we have successfully developed air pressure sensor. The working area of the developed pressure sensor can be set by adjusting the membrane thickness. The flat coil element has also been developed for vibration sensor. Vibration like earthquake is a phenomenon of physics. The characteristics of these vibrations can be used as an early warning system so as to reduce the loss or damage caused by earthquakes. For this purpose the sensor should measure vibration in low frequency area. The developed vibration sensor can be used to measure the vibration until 0.2 Hz. Finally, we have succeeded in developing the flat coil element for moment of force sensor. The developed sensor showed good reproducibility and good reliability with relative error under 3%. Sensor models based on mathematical approach of each sensor have also been developed.

Brief Biography of the Speaker: Mitra Djamal received B.Sc. degree in physics from Institut Teknologi Bandung in 1984 and the Dr.-Ing. degree in electrical and electronic engineering, especially in the field of sensors, in Universitaet der Bundeswehr Muenchen, Germany in 1992. He joined the Faculty of Mathematics and Natural Sciences, ITB, since 1986. In 2001 he became Associate Professor and became full Professor since 2009. His research interest is about sensors and instrumentation. Currently he is reviewer of some international journals, patent holder of some sensors, member of IEEE, chairman of Indonesian Sensor and Actuator System Society (ISASS) and vice chairman of Indonesian Physical Society (HFI). He is also author of more than 125 papers published in international journals and conference proceedings, and invited book chapters.

Plenary Lecture 10

Network Coding: Preliminaries, Theory and Implementation

Professor Zoran Bojkovic
Full Professor of Electrical Engineering
University of Belgrade
SERBIA
E-mail: z.bojkovic@yahoo.com

Abstract: This presentation aims to be an invitation to engineers and mathematicians to join the work in network theory and implementation, drawing attention to highlights network coding research from the goals and perspectives point of view. At the same time, it is of importance to pave the way towards future theoretical and practical research and development in this area. Network coding (NC) is a new example in data transmission that combines coding with data propagation over a network. Linear network coding (LNC) adopts linear coding scheme at every node of the network and promises the optimal data transmission rate from the source to all receivers. Linearity enhances engineering simplicity which leads to wide applicability. The idea is that the bits in information flows can be mixed as long as receiving hosts have received sufficient evidence to reconstruct the original packets from the sending hosts.There exists tremendous potential for the theory of NC to affect the design of next generation network protocols.

In the first part of this presentation, some network coding principles will be reviewed. Deep connections between LNC and algebra will be demonstrated, too. Also, it will be pointed out that employing coding at the nodes, network capacity can be increased compared with employing routing alone in the simple network topology known as butterfly network. NC may find practical applications in a wide variety of communication networks and systems, starting from cloud computing systems to mobile applications.On the other hand, a key development of network coding is the fact that the maximum multicast communication capacity can be achieved using only LNC.

The second part of this work, deals with coding across data which has been put to extensive use in today's communication systems at link level. Also, it has been emphasized that applications involving peer-to-peer (P2P) networks, such as video streaming, may become the most promising scenario for NC to be deployed in real-world systems.Conceptually, random NC may be beneficial in both P2P content distribution and live streaming systems (NC in mobile phones, operational on-demand streaming with random network coding). In a wireless setting, transmitting a packet from one node to another causes interference to all nearly nodes. If multiple nodes transmit concurently, their waveforms are linearly superimposed, which makes it harder for a receiver to recover its desired packets. As for reliable physical layer network coding, it involves two complementary questions: (a) how to enable encoders and decoders to exploit interfering signals for efficient function computation, and (b) at the network level, which functions to select in order to enable efficient overall information transfer.

Brief Biography of the Speaker: Prof. Dr. Zoran Bojkovic (http://www.zoranbojkovic.com) is a Full Professor of Electrical Engeenering at the University of Belgrade, Serbia, and a permanent visiting professor at the University of Texas at Arlington, TX, USA, EE Department, Multimedia System Lab. He was a visiting professor in more than 20 Universities worldwide and has taught a number of courses in the field of digital signal processing, computer networks and multimedia communications. Prof. Bojkovic is the co-author of 6 international books/monographies (Publishers: Prentice-Hall, Wiley, CRC Press, WSEAS Press, Editura Politechnica). Some of them have been published in Canada, Japan, China, Singapore, India and Romania. He is co-editor in 68 International Books and Conference Proceedings. He has published more than 430 papers in peer-reviewed journals, conference proceedings and publications. His activities included serving as Editor-in-Chief in 2 International Journals and Associate Editor in 3 International Journals. Prof. Bojkovic was co-chair for more than 10 International Symposium and Conferences and has served of more than 50 International Symposiums and Conferences. He has conducted many keynote/plenary lectures, workshops/tutorials as well as seminars and participated in many international scientific and industrial prjects. He has been and is yet a consultant to industry, research institutes and academia. He is a Senior Member of IEEE and WSEAS, Member of EURASIP and IASTED, Member of SERSC, Korea, expert of IAMSET, full member of Engineering Academy of Serbia and a member of Serbian Scientific Society.

Plenary Lecture 11

Land Use Changes Modeling Based on Different Approaches: Fuzzy Cognitive Maps, Cellular Automata and Neural Networks

Professor Maria Moise
Faculty of Computer Science for Business Management
Romanian American University
Bucharest, ROMANIA
E-mail: maria.moise@rau.ro

Abstract: For modeling land use changes there are different approaches based on: Fuzzy Cognitive Maps, Cellular Automata, Neural Network etc. Fuzzy Cognitive Maps (FCMs) approach is a modelling methodology, developed as an expansion of cognitive maps. FCMs belong to the class of neuro–fuzzy systems and they are able to incorporate human knowledge and adapt it through learning procedures. FCMs can be used in different fields for example: political developments, organizational behaviour and job satisfaction, but also they are capable of modelling scenarios described in terms of significant events or concepts and their cause-effect relationships. One of the most useful aspects of the FCM is its potential for use in decision support as a prediction tool, for example given an initial state of a land use, represented by a set of values of its constituent concepts, a FCM can simulate its evolution over time to predict its future behaviour. Cellular Automata approach based on Cellular Automata models consists on a simulation environment represented by a grid of space (raster cells), in which the state of a cell is changing to another state by using a set of transition rules taking into account the attributes of cells in its vicinities. Although CA models are widely applied to simulate various spatio-temporal phenomena, particularly for modeling land use changes, however the implementing of a CA model and its calibration is complicated because there is a large set of parameters of the transition rules and also the numerical values of these parameters, that must be find. For Cellular Automata calibration there are statistical techniques (logistic and multiple regressions, principal component analysis and multivariate analysis of variance) and computational intelligence techniques (neural network, genetic algorithm and data mining). The Neural Networks have the capacity to recognize and classify patterns through training or learning processes and they can be used in urban studies. They provide a better performance than the statistical techniques, because they better handle uncertainties of spatial data. These approaches were proposed in the “Future Policy Modeling – FUPOL” project, financed by FP7 (www.fupol.eu), for modeling land use, one of the urban policy domains, in order to support the politicians and decision makers of local level for the decision making process.

Brief Biography of the Speaker: At present, Maria Moise is full-time professor at the Faculty of Computer Science for Business Management of the Romanian American University (RAU) of Bucharest, Romania, and also she is Vice Rector with research activity. Between 1999-2003 she was Dean and Rector at AISTEDA University of Bucharest. She received the M. Sc. in Mathematics at the University of Bucharest, specialized in Operation Research in 1972, and in 1996 she obtained his doctoral degree in Economic Informatics at the Academy of Economic Studies of Bucharest in the field of information systems & intelligent systems applied in economic area. Since 1972 until 1999 she worked as scientific researcher at National Institute for Research & Development in Informatics, and also she was teaching at University of Craiova, Polytechnic University of Bucharest and Academy of Economic Studies of Bucharest. Between 1993-1994, Professor Moise obtained two Research Fellowships at LAFORIA Laboratory of P. M. University, Paris VI and she worked in the field of Decision Support Systems, Expert Systems and Fuzzy Logic. Between 2001-2003 she was standing member of Steering Committee regarding “Promoting Multimedia Access for Education and Training in European Society” - PROMETEUS - EU, as Romanian representative. Her research interests include intelligent systems, neural networks, fuzzy logic, rough sets, mathematic modeling, web technologies, e-learning environments, e-business, e-government and e-health. She is the author/co-author of 22 books and over 180 scientific papers. She has extensive experience in IT project management, having more than 50 research contracts funded by National/International Programs. She has been the organizer of several national/international conferences. She was also national assessor of National Programs (CEEX, PNCDI) and also European expert at FP6 (e-business) and FP7. At present, she is Legal Entity Appointed Representative-LEAR/Scientific and Technical Director from RAU, as partner of FUPOL – Future Policy Modeling project, financed by FP7 (www.fupol.eu).

Plenary Lecture 12

A Bayesian-Reliability Based Approach of Multi-Agent System in Dynamic Environments

Assoc. Professor Gabriela Tont
Control Systems Engineering and Management Department
Faculty of Electrical Engineering and Information Technology
University of Oradea
ROMANIA
E-mail: gtont@uoradea.ro

Abstract: Dynamic modeling of multi-agent system interactions and modeling complex dynamic environments request devoted dynamic indicators. In complex dynamic environments under conditions of uncertainty, reliability targets have to be realistic and systematically defined in a meaningful way for marketing, engineering, testing, and production. Potential problems proactively identified and solved during design phase and products launched at or near planned reliability targets eliminate extensive and prolonged improvement efforts after start on. The real-life complex development situations express that the methods applied to new product development process content reliability risks which require assessment and quantification at the earliest stage, extracting relevant information from the process. The lecture proposes the computationally efficient adaptive multi-agent approach of estimation of the shape parameters in a complex data structures approached with exponential gamma distribution as model of life time, reliability and failure rate functions in multi-agent system in complex dynamic environments. The reliability indices of studied systems, approached by the means of Extended Generalized Stochastic Petri Nets (EGSPN) and a method dedicated to nonlinear systems integrate the collaboration of multiple systems components for the purpose of proactive and adaptive management. The numerical simulation performed in the case study validates the correctness of the proposed methodology.

Brief Biography of the Speaker: Gabriela Tonț earned Ph. D degree in Electrical Engineering at Technical University Cluj Napoca.
She is currently an associate professor in the Department of Control Systems Engineering and Management, University of Oradea.
She has actively carried out research and teaching activities in the areas of reliability engineering, and engineering management, multiple participant-multiple objective decision making, risk analysis, and decision support systems. Most of her research interests lie within the field parallel and distributed systems, and methodologies to optimally fuse multiple sensors information in robotic systems. Her research areas relate to applied statistics and innovative applications of probability in reliability data, accelerated testing, survival analysis, linear and non-linear.
In the fields above she has authored and co- authored over 190 scientific publications.
As certified external quality auditor, she has extensive experience with six sigma initiatives, optimizing manufacturing processes and quality system improvements.
She is the Technical Program Co-Chair (in 2008) in the 9-th WSEAS International Conference on Automation and Information (ICAI' 08), participates and reviews for WSEAS International Conferences.

Plenary Lecture 13

Weak-axes bending vibrations of beams with variable cross-section

Professor Gilbert-Rainer Gillich
Faculty of Mechanics and Materials Science
"Eftimie Murgu" University of Resita
Romania
E-mail: gillichrainer@yahoo.de

Abstract: Gilbert-Rainer Gillich is Professor of Vibrations and Machine dynamics at the Faculty of Mechanics and materials Science of the "Eftimie Murgu" University of Resita - Romania. He earned undergraduate degree in Mechanical Engineering (1986) and PhD degree in Strength of materials, elasticity and plasticity (1999) at the "Politehnica" University of Timisoara. He gained extensive industrial experience in various fields of mechanical engineering, by working in the Steel Factory of Resita, which is completed by teaching and research activities at the "Eftimie Murgu" University of Resita and the Research Institute for Construction Equipment and Technology from Bucharest. These activities are concretized in 5 books and more than 70 articles in reference journals and international conferences, 17 finalized national and international founded research projects and 2 patents. Since 2002 he currently held courses at: Johannes Gutenberg Universitat Mainz (Germany) and Universita degli Studi di Sassari (Italy). He is official reviewer of some journals indexed in international databases and was involved in organizing international conferences as co-organizer, stream proposer or acting as program committee member or reviewer. He is member of the International Institute of Acoustics and Vibration (IIAV), European Acoustics Association (EAA), European Association for Signal Processing (EURASIP), the Balkan Environmental Association (B.EN.A.), The General Association of Engineers in Romania (AGIR), Romanian Acoustic Society (SRA), Romanian Association of Tensometry (ARTENS) and Robotics Society of Romania (SRR). His research interests are: Applied mechanics and vibration; Damage detection; Structural health monitoring; Signal analysis and signal processing; Acoustics; Environmental issues.

Brief Biography of the Speaker: The paper presents the way how natural frequencies of weak-axis bending vibration modes of beams change due to discontinuities. The authors have contrived a correlation between the strain energy stored in a segment of the beam, which is proportional with the mode shape curvature of a considered frequency mode at the location where the segment is placed, and the frequency change for this mode if damage appears on that segment. The phenomenon is more evident for open cracks, while closed notches have lower influence on the beam's dynamic behavior. A general relation was worked out; it permits the calculus of the natural frequencies of all bending modes, for any cross-section area and shape, length and support type respectively.

Plenary Lecture 14

Numerical methods applied in electrical circuits

Lecturer Carmen M. Lungoci
Electrical Engineering and Computers Science Faculty
Electrical Engineering and Applied Psychics Department
Transilvania University of Brasov
Romania
E-mail: lungoci@unitbv.ro

Abstract: In recent years numerical methods are increasingly used because they allow an approach of engineering issues of high complexity. An important applicative area of them is given by the electric circuit theory.
Electric circuits in steady regime require mathematical solving. The electrical model of a complex circuit is transposed into a mathematical system of linear equations of higher rank. For solving this system, direct or iterative algorithms are implemented. Principal's numerical methods are briefly reviewed, than an application used in electrical engineering is detailed. The software developed for running the iterative algorithms is presented. On the same example, how to apply the theory of graphs is shown. Results of applying the various numerical algorithms are compared and analyzed.
Another important part of electric circuit theory is represented by dynamic circuits. For their solving, systems of differential equations knowledge are-required. Two methods are detailed in this presentation and the implementation of them is done.

Brief Biography of the Speaker: Carmen Mihaela Lungoci is graduated from Politehnica University, Bucharest, Romania, in Automation for Industrial Control field. She worked as RPG programmer on OS systems, than as a senior researcher in IT area also. In 2009 she received the Ph.D. degrees in Electrical Engineering from Transilvania University of Brasov. From 2009 she is lecturer at this university, on the Electrical Engineering and Applied Psychics Department of the Electrical Engineering and Computers Science Faculty. Her current research area deals with applications of numerical methods in electrical engineering, energy management in automotive systems, energy and environment. She published more than 30 articles in proceedings of internationals conferences and journals.