Editors:
Prof. Gia Sirbiladze, Iv. Javakhishvili Tbilisi State University, Georgia
Prof. Anna Sikharulidze, Iv. Javakhishvili Tbilisi State University, Georgia
Prof. Irina Khutsishvili, Iv. Javakhishvili Tbilisi State University, Georgia
Prof. Tamar Lominadze, Georgian Technical University, Georgia

Computing and Computational Intelligence

Proceedings of the
- EUROPEAN COMPUTING CONFERENCE (ECC '09)
&
- 3rd International Conference on
COMPUTATIONAL INTELLIGENCE (CI '09)

Tbilisi, Georgia, June 26-28, 2009

Electrical and Computer Engineering Series
A Series of Reference Books and Textbooks

ISBN: 978-960-474-088-8
ISSN: 1790-5117

Published by WSEAS Press
www.wseas.org

Computing and Computational Intelligence

COMPUTING and COMPUTATIONAL INTELLIGENCE

Proceedings of the EUROPEAN COMPUTING CONFERENCE (ECC '09)
Proceedings of the 3rd International Conference on COMPUTATIONAL INTELLIGENCE (CI '09)

Tbilisi, Georgia
June 26-28, 2009

Hosted and Sponsored by:
Iv. Javakhishvili Tbilisi State University
Georgia

Electrical and Computer Engineering Series
A Series of Reference Books and Textbooks

Published by WSEAS Press
www.wseas.org

ISSN: 1790-5117
ISBN: 978-960-474-088-8

COMPUTING and COMPUTATIONAL INTELLIGENCE

Proceedings of the EUROPEAN COMPUTING CONFERENCE (ECC '09)
Proceedings of the 3rd International Conference on COMPUTATIONAL INTELLIGENCE (CI '09)

Tbilisi, Georgia
June 26-28, 2009

Electrical and Computer Engineering Series
A Series of Reference Books and Textbooks

Published by WSEAS Press
www.wseas.org

All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

ISSN: 1790-5117
ISBN: 978-960-474-088-8

World Scientific and Engineering Academy and Society

COMPUTING and COMPUTATIONAL INTELLIGENCE

Proceedings of the EUROPEAN COMPUTING CONFERENCE (ECC '09)
Proceedings of the 3rd International Conference on COMPUTATIONAL INTELLIGENCE (CI '09)

Tbilisi, Georgia
June 26-28, 2009

Morgavi Giovanna, ITALY
Daphne Halkias, GREECE
Sungwan Han, KOREA
Nicholas Harkiolakis, GREECE
Athanasios Hatzigaidas, GREECE
Koichi Higuchi, JAPAN
Jaroslav Hlava, CZECH REPUBLIC
Kun-Lin Hsieh, TAIWAN
Chin-pao Hung, TAIWAN
Mousa Hussein, UNITED ARAB EMIRATES
Bozidar Jakovic, CROATIA (HRVATSKA)
Tomaz Javornik, SLOVENIA
Devinder Kaur, UNITED STATES
Derk Jan Kiewiet, "NETHERLANDS
Il-hwan Kim, KOREA
Chom Kimpan, THAILAND
George Kliros, GREECE
Hana Kopackova, CZECH REPUBLIC
Niksa Kovac, CROATIA (HRVATSKA)
Jiri Krupka, CZECH REPUBLIC
Cheng-chien Kuo, TAIWAN
Eungyong Lee, KOREA
Jeong Ho Lee, KOREA
Lily Li, AUSTRALIA
Xinben Li, CHINA
Qian Li, CHINA
Chunping Li, CHINA
Lina-Maria Stanca, ROMANIA
Shieh-Shing Lin, TAIWAN
Virginia Little, UNITED STATES
Shi-Jer Lou, TAIWAN
Martin Macko, CZECH REPUBLIC
Supawee Makdee, THAILAND
Charalampos Manifavas, GREECE
Niculescu Marius-Cristian, ROMANIA
Enrique Merida-Casermeiro, SPAIN
Hiroyuki Mitsuhara, JAPAN
Djouadi Mohand Saed, ALGERIA
Mihael Mohorcic, SLOVENIA
Gholam Ali Montazer, IRAN
Bernard Moulin, CANADA
Nabil Moussa, BAHRAIN
Mihaela Muntean, ROMANIA
Seung Na, KOREA
Kuo Nai-Wen, TAIWAN
Nobuo Nakajima, JAPAN
Elias Nassar, LEBANON
Victor-Emil Neagoe, ROMANIA
Roman Neruda, CZECH REPUBLIC
Michiko Oba, JAPAN
Kyu-Cheol Oh, KOREA
Tiejun Pan, CHINA
ang-Sung Park, KOREA
Anca Petrisor, ROMANIA
Mircea Popa, ROMANIA
Marius Constantin Popescu, ROMANIA
Domenico Porto, ITALY
Wichian Premchaiswadi, THAILAND
Khalid Qaraqe, UNITED STATES
Elias Rachid, LEBANON
Mindaugas Rybokas, LITHUANIA
Jean Saade, LEBANON
Kassem Saleh, UNITED ARAB EMIRATES
Rocio Sanchez, SPAIN
Eugenio Santos, SPAIN
Hyun Soon Shin, KOREA
G. Silahtaroglu, TURKEY
Seppo Sirkemaa, FINLAND
Igor Skrjanc, SLOVENIA
Andre Slabbert, SOUTH AFRICA
Pamela Solvie, UNITED STATES
Moon Ting Su, MALAYSIA
Anna Trifonova, ITALY
Chieh-yuan Tsai, TAIWAN
Vasilis Tsoukalas, GREECE
Anghel Vasile, ROMANIA
Roman Vitenberg, ISRAEL
Yi-Shun Wang, TAIWAN
Chi-jui Wu, TAIWAN
Jianbo Xu, CHINA
Pelin Yildiz, TURKEY
Mustapha C.E. Yagoub, CANADA
Xiaoyan Yang, CHINA
Xiaobo Yang, UNITED KINGDOM
Aimin Yang, CHINA
Shoujian Yu, CHINA
Pao-Ta Yu, TAIWAN
Liangbin Zhang, CHINA
Janis Zuters, LATVIA

Preface

This year the EUROPEAN COMPUTING CONFERENCE (ECC '09) and the 3rd International Conference on COMPUTATIONAL INTELLIGENCE (CI '09) were held in Tbilisi, Georgia. The Conferences remain faithful to their original idea of providing a platform to discuss software engineering, hardware engineering, knowledge engineering, internet technologies, neural networks, fuzzy systems, evolutionary computing 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

Table of Contents

Plenary Lecture 1

Evolutionary Computation using Logic Programming

Assistant Professor Jorge Ribeiro
School of Technology and Management
Polytechnic of the Institute of Viana do Castelo
Portugal
E-mail: jribeiro@estg.ipvc.pt

Abstract: The Evolutionary Computation covers sets of algorithms inspired by the theory of the species evolution. The interconnection between the Artificial Intelligence techniques such as Genetic Algorithms and Artificial Neural Networks for the creation of evolutionary systems is applied in the resolution of various types of problems in particular in the optimization processes. The objective of this union is to combine symbolic and conexionist systems in order to optimize the description of the universe of discourse represented by logic functions. We focus on the study of the combination of Artificial Neural Networks with Genetic Algorithms to investigate the descriptive power of the Extended Logic Programming in order to qualify the description of the universe of discourse or theories expressed by logic mathematical functions. With this theories and methodologies the goal is to get the best value of the quantification theory which corresponds to the best logic mathematical functions and try to optimize it.

Brief Biography of the Speaker: Jorge Ribeiro was born in 1975, in Braga, Portugal and is Assistant Professor of the School of Technology and Management Polytechnic of the Institute of Viana do Castelo - Portugal. Is teaching in the Artificial Intelligence, Systems Integration and Enterprise Information Systems field. Is member of the Artificial Intelligence Group of the Informatics Department of the University of Minho - Portugal. He received MSc degree in computer science (2002) from the University of Minho-Portugal. His PhD dissertation (at the Department of Electronic and Computation of the University of Santiago de Compostela, Spain.) addresses the optimization of logic mathematical functions applying evolutionary systems in order to maximize the quality-of-information. He has been an author and co-author of some papers in the field of Data Mining, Software Engineering, Knowledge Representation and Evolutionary Systems.

Plenary Lecture 2

Visualizing Programs

Professor Harald Wertz
Department of Computer Science
Laboratoire d' Informatique Avancee de Saint- Denis (LIASD)
2, Rue de la Liberte
93526 Saint-Denis Cedex, France
E-mail: hw@ai.univ-paris8.fr

Abstract: During their live cycle, programs have a tendency to grow and, by the way, to increase their complexity, thus becoming harder and harder to read, to understand and to maintain. But understanding programs is necessary for their continuous evolution, their maintenance and debugging.
Various tools, such as metrics, abstract interpretation, model checking, code coverage, program slicing, data-flow analysis, pointer analysis, call graphs, data-flow graphs and dependency graphs (to name but a few), have been developed to help programmers in their understanding of the structure and functioning of programs. In this lecture we will present various ways of displaying graphs and focus on the impact of visualization of such static and dynamic data dependencies in the context of program maintenance. We will examine several prototypes we have developed in our laboratory, detailing especially the different visualizations we propose, which are aimed to minimize the conceptual overload in order to allow users to deal with hard to understand or buggy programs.

Brief Biography of the Speaker: Harald Wertz was born in 1947 in Friedrichshafen, Germany, and is living in France since 1971. He is Professor of Computer Science at the Universite Paris 8, France, since 1978, and he is a founding member of the Franco-Georgian Institute. He loves to teach introductory programming classes, artificial intelligence and software engineering. His research focuses mainly on the intersection between artificial intelligence and software engineering: finding computational methods helping to understand, debug and meaningfully represent programs. His doctoral thesis, at the University of Paris 6, described a Lisp-system able to automatically debug programs written by novice programmers. His ‘these d’etat es science’, at the Universite de Vincennes, described the structure, implementation and use of an integrated and incremental programming environment, which included (then) novel features such as automatic documentation, automatic construction of outstanding task lists, on the fly correction, reverse execution and executable program annotation. He is the author of three books, several book chapters and some seventy papers.

Plenary Lecture 3

Computer-Aided Simulation Methods for Measuring the Accuracy of Converters

Professor Costin Cepisca
Faculty of Electrical Engineering
POLITEHNICA University of Bucharest
Romania
E-mail: costin.cepisca@upb.ro

Abstract: The measurement information systems make use of different converters whereby the link between the signal converters and the system bus impose structural and algorithmic methods for increasing accuracy.
The simulation methods are applied for measurement of powers and energies in electrical networks using instrument transformers. The transformers allow the measurement of the effective value but, in certain cases, one can note errors in the measurement of the electric power and energy.
In most practical cases a current transformer consists of a traditional instrument with magnetic core. Accuracy specifications of these devices are generally assured under sinusoidal conditions. When distorted waveforms are dealt with, CTs can introduce large uncertainties, thus leading to gross measurement errors.
A variety of techniques is reported for improving the performance of instrument transformers. In many cases they refer to hardware circuits for electronically compensated devices. More recently, several different software compensation techniques have been introduced for limiting the errors. Following a similar approach, digital compensation methods have been proposed to significantly reduced hysteresis and eddy currents effects.
In the present paper, we present different models of current transformers and computer methods for the simulation of characteristics and evaluation of measurement errors, with the goal of increasing the measurement accuracy.

Brief Biography of the Speaker: Costin Cepisca was born in Bucharest, Romania, on May 21, 1949. He received the degree in electrical engineering (1972) and the Ph.D. (Dr.ing.) from Bucharest Polytechnic Institute in 1983.
He is currently Professor of measurement systems at the POLITEHNICA University of Bucharest, Head of Research Centre for Metrology and Measurement Systems and former Vice-Dean of Faculty of Electrical Engineering.
His present research interest includes the sensor interface systems, analogue circuit design and signal processing, measurement theory and power quality. He has published more 600 technical papers and 60 books and has been involved in numerous government and industrial projects in area of measurements and instrumentation.

Plenary Lecture 4

Finsler Optimal Control and Geometric Dynamics

Professor Constantin Udriste
Department of Mathematics
University Politehnica of Bucharest
Romania
E-mail: anet.udri@yahoo.com

Abstract: This paper relates the theory of optimal control to the Finsler geometry and to the geometric dynamics. Section 1 shows how we build a Finsler structure starting from an optimal control problem. Section 2 studies a dynamic system evolving over time and controlled through a Finsler control. In order to choose properly the controls, we use a payoff functional and the Pontryaguin Maximum Principle. Section 3 transforms a controlled evolution system in a Finsler geometric dynamics. Section 4 introduces the idea of the controlled Finsler gradient flows in optimization problems. Section 5 studies the Finsler optimal control attached to Rosenbrock function. Section 6 formulates a Finsler affine regulator problem. Section 7 describes a Finsler optimal growth model.

Brief Biography of the Speaker: Important Career Positions: Dean, Director, Chair, Full Professor 1990-, University Politehnica of Bucharest, Department of Mathematics.
Number of PhD Students: 25 in due time and 13 Doctors in Mathematics.
Membership of Associations: AMS, 1987; Tensor Society, 1985; Balkan Society of Geometers, President, 1994;
Publications: over 40 books; 200 papers; 200 communications.
Honors: D. Hurmuzescu Prize, Romanian Academy, 1985; Award MEI, 1988; Correspondent Member, Academia Peloritana, Messina, 1997; Titular Member, Academy of Romanian Scientists, 2007; Honorary Member, World Scientific and Engineering Academy and Society, 2008-;
Organizer: The International Conference of Differential Geometry and Dynamical Systems, University Politehnica of Bucharest, October 5-7, 2007; 7th WSEAS International Conference on Systems Theory and Scientific Computation (ISTASC'07), Vouliagmeni Beach, Athens, Greece, August 24-26 (2007); European Computing Conference, Vouliagmeni Beach, Athens, Greece, September 24-26, 2007; 12th WSEAS International Conference on Applied Mathematics, Cairo, Egypt, Dec. 29-31, 2007; 7th WSEAS International Conference on Circuits, Systems, Electronics, Control and Signal Processing, Cairo, Egypt, Dec. 29-31, 2007; Chair-Committee: American Conference on Applied Mathematics (Math'08) and Management, Marketing and Finances (MMF'08), Cambridge, Massachusetts, USA, March 24-26, 2008; International Program Committee: The Applied Computing Conference (ACC-08), Istanbul, Turkey, May 27-30, 2008.
Fields of Interest: Differential Geometry, Optimizations on Riemannian Manifolds, Magnetic Dynamical Systems, Geometric Dynamics.

Plenary Lecture 5

Data Aggregations Techniques in Over-Sampling Converters

Professor Sorin Dan Grigorescu
Faculty of Electrical Engineering
POLITEHNICA University of Bucharest
Romania
Email: sorin.grigorescu@upb.ro

Abstract: Data flow reduction in digital instrumentation usually comes with the benefit of statistical processing for noise cancellation and preservation of signals correlation parameters among an overall compression of information. Over-sampling techniques offer the unique characteristic of noise shaping in analog to digital converters providing additional accuracy for measurements with the cost of local signal processing for decimation of data.
We present several techniques of data aggregation regarding sigma-delta modulators used in energy counters and power quality analyzers performing unconventional statistical data processing and data aggregation bought in time and frequency domains. Simulations for code and time interpolation data reduction have been performed for primary data flow of the measurement chain and for data collection aggregation for compact power quality parameters extraction.

Brief Biography of the Speaker: Sorin Dan Grigorescu was born in Bucharest, Romania on June 8, 1958. He received the degree in electronics and telecommunications (1984) and the Ph.D. (dr. eng.) from the Bucharest Polytechnic Institute in 1996.
He performs research and teaching as Professor of virtual instrumentations and distributed measurement systems at the POLITEHNICA University of Bucharest. His research field includes signal processing, monitoring complex systems, power quality and transducers.
He has published more than 200 scientific papers and 20 books, being the head of research team for several governmental and industrial projects in the fields of instrumentation, power quality and integrated control of the drilling rigs.

Plenary Lecture 6

Neural Networks: A Bridge Towards Self-Observation

Associate Professor Jean-Jacques Mariage
Computing Science Department
Laboratoire d' Informatique Avancee de Saint-Denis (LIASD)
2, Rue de la Liberte
93526 Saint-Denis Cedex, France
E-mail: jam@ai.univ-paris8.fr

Abstract: Regardless of their increasing number and diversity, the capacities of Neural Network (NN) models still remain far behind the ones biological systems can exhibit when faced to changing environments or other complex processes. As an attempt to better understand why, we propose to investigate the variations of a few NN algorithms in the theoretical framework of Darwinian evolution in order to favor the emergence of more global models through gradual adaptive developmental steps.
First, we explore the possibility to achieve a more general conception of learning and training methodology, detached from specialized NN models. Then, with the ultimate goal to bypass human bias constraints in data acquisition, we apply NNs to the automatic categorization of natural language data without prior knowledge.
To this end, we argue that enhanced plasticity and reorganization capabilities are necessary for NNs in order to be able to detect and structurally integrate variations in the data space. A first step is to model and simulate the dynamic character of the “biological” learning structures and processes as well as their evolution over time. We propose a dual architecture, where two –possibly identical– NNs collaborate, one learning to control the efficiency of the other. This way, a reflexive loop of self-supervision can be achieved where one NN learns to tune the configuration parameters (wiring, growth, learning rate, etc.) of the other through automated trial and error sessions. A further step is the use of data driven programming combined with error measures in the self-supervision loop to create a self-observing retroactive loop in order to analytically develop an active, event guided, learning. The previously mentioned dual architecture can then be used to learn to extract and apply characteristic learning features of other NN models. NNs would thereby, in response to environmental changes, put into practice their acquired adaptive developmental capabilities to generate the appropriate variations, both at the architectural and procedural level.
We will also distinguish different scales of structural variations in the natural – and mostly biological – world in order to illustrate emergent steps in the evolution of developmental strategies, similar to those nature has selected.

Brief Biography of the Speaker: Jean-Jacques Mariage was born in Saisseval, France, in 1953. He is Associate Professor of Computer Science at the University of Paris 8 since 2001, where he joined the Artificial Intelligence Laboratory. He teaches at the Franco Georgian Institute since 2006. His teaching activity involves Artificial Intelligence, programming languages and computer network engineering. His current research addresses the integration of a self-observing retroactive loop in unsupervised Neural Network (NN) models, applied to the automatic categorization of natural language data without previous knowledge. To this end, his interest focuses on the modeling and simulation of the developmental dynamics of adaptive encoding structures as found in biological systems. His areas of interest include learning, memory, evolution, NN algorithms, genetic algorithms, evolutionary programming, artificial life as well as the development, replication and adaptation of biological encoding structures.

Plenary Lecture 7

A Fuzzy Identification Problem for the Stationary Discrete Extremal Fuzzy Dynamic System

Professor Gia Sirbiladze
Department of Computer Science
Faculty of Exact & Natural Sciences
Iv. Javakhishvili Tbilisi State University
Georgia
E-mail: gia.sirbiladze@tsu.ge

Abstract: This work deals with the problem of the Stationary Discrete Extremal Fuzzy Dynamic System (SDEFDS) identification and briefly discusses the results developed by G. Sirbiladze. The fuzzy process with possibilistic uncertainty, the source of which is expert knowledge reflections, is constructed. The dynamics of SDEFDS is described. Based on the fuzzy-integral model, methods and algorithms are developed for identifying the transition operator of the stationary discrete extremal fuzzy dynamic system. The SDEFDS transition operator is restored by means of expert data with possibilistic uncertainty, the source of which is expert knowledge reflections on the states of SDEFDS in the extremal fuzzy time intervals.
The regularization condition for obtaining a quasi-optimal estimator of the transition operator is represented by the theorems. The corresponding calculating algorithm is provided. The results obtained are illustrated by the example in the case of a finite set of SDEFDS states.

Brief Biography of the Speaker: Dr. Gia Sirbiladze is a full professor at the Department of Computer Science of Faculty of Exact & Natural Sciences of Iv. Javakhishvili Tbilisi State University, Georgia. He received his Ph.D. degree in 1991 from the Computational Mathematics Institute of the Georgian Academy of Science. He received his D. Sci. degree from the same institute in 2005. His scientific interests include areas such as Intelligent Fuzzy Technologies and General Systems, Fuzzy Technologies in Decision-making Support Systems, Fuzzy Extremal Dynamic Systems - Control, Filtration and Identification, Fuzzy Discrete Optimization Problems and Modeling Decisions. Dr. Gia Sirbiladze has published 54 scientific papers on the above-listed topics. He is an author of one monograph on Decision Making Problems in General Environment. Dr.Gia Sirbiladze has participated in many scientific conferences, including plenary speeches on WSEAS conferences. Dr.Gia Sirbiladze is a member of the National Union of Mathematicians in Georgia. He serves as a reviewer for Mathematical Reviews. He has reviewed papers for more then 15 international and local journals and conferences. He serves as Information Technology expert for Georgian National Scientific Fund. Dr.Gia Sirbiladze has participated in several national and international research projects.

Plenary Lecture 8

On the Optimality of a General Production Lot Size Inventory Models with Variable Parameters

Professor Zaid Balkhi
King Saud University, College of Science
Department of Statistics and Operations Research
Saudi Arabia
E-mail: ztbalkhi@ksu.edu.sa

Abstract: A general production lot size dynamic inventory model with deteriorating items for which the rates of demand, production, deterioration as well as the cost parameters are arbitrary and known functions of time is considered in this paper. Shortages are allowed but are partially backordered. Both inflation and time value of money are taken into account. The objective is to minimize the total net inventory cost. The relevant model is built, solved and some main results about the uniqueness and the global optimality of this solution, with the use of rigorous mathematical methods, are obtained. An illustrative example is provided.

Brief Biography of the Speaker: Degrees: B.Sc. in mathematics (Probability and Mathematical Statistics Section) Damascus University 1971-High Diploma in pure mathematics, Damascus University 1979 - Studying several post graduate courses in Optimization, Probability and Statistics Brussels University 1980 - Dr. of Science in applied mathematics (Belgian Ph.D in applied mathematics- OR oriented) with honors, University of Brussels 1983.
Positions: Professor in King Saud University, College of Science, Department of Statistics and Operations Research since May 2005.,Associate Professor King Suad University, College of Science, Department of Statistics and Operations Research, 1998 -Assistant Professor, King Saud University, College of Science, Department of Statistics and Operations Research, From 1983 to 1998- Demonstrator in Mathematic Department in Damascus University 1979.
Professional Experience: He has about 27 years academic teaching experience in Operations Research, Statistics, and Mathematics, supervising several M.Sc. and PhD thesis., Main contributor in the design and development of the B.Sc. and M.Sc. and PhD Programs in Operations Research And Statistics in the Department of Statistics and Operations Research in King Saud University (Riyadh - Saudi Arabia), Member in the editorial board of “Journal of Scientific Inquiry” , Acting as a referee for more than 15 specialized and leading international journals (more than 20 papers per year) . He contributed in many Local and International Scientific Conferences and Symposiums. He Contributed in giving consultations in solving local real problems in Saudi Arabia using the OR techniques.
His Research Interests: are in Applied Mathematic (Operations Research Oriented). In particular, Optimal Search problems where he has more than 10 research papers. Recently he research turns to Inventory Control problems with more than 35 publications in a scientific and leading journals.. He also authored 4 books in Fundamentals of Operations Research, Inventory Control, Game Theory, and Integer Programming.

Authors Index