Editors

Nikos Mastorakis
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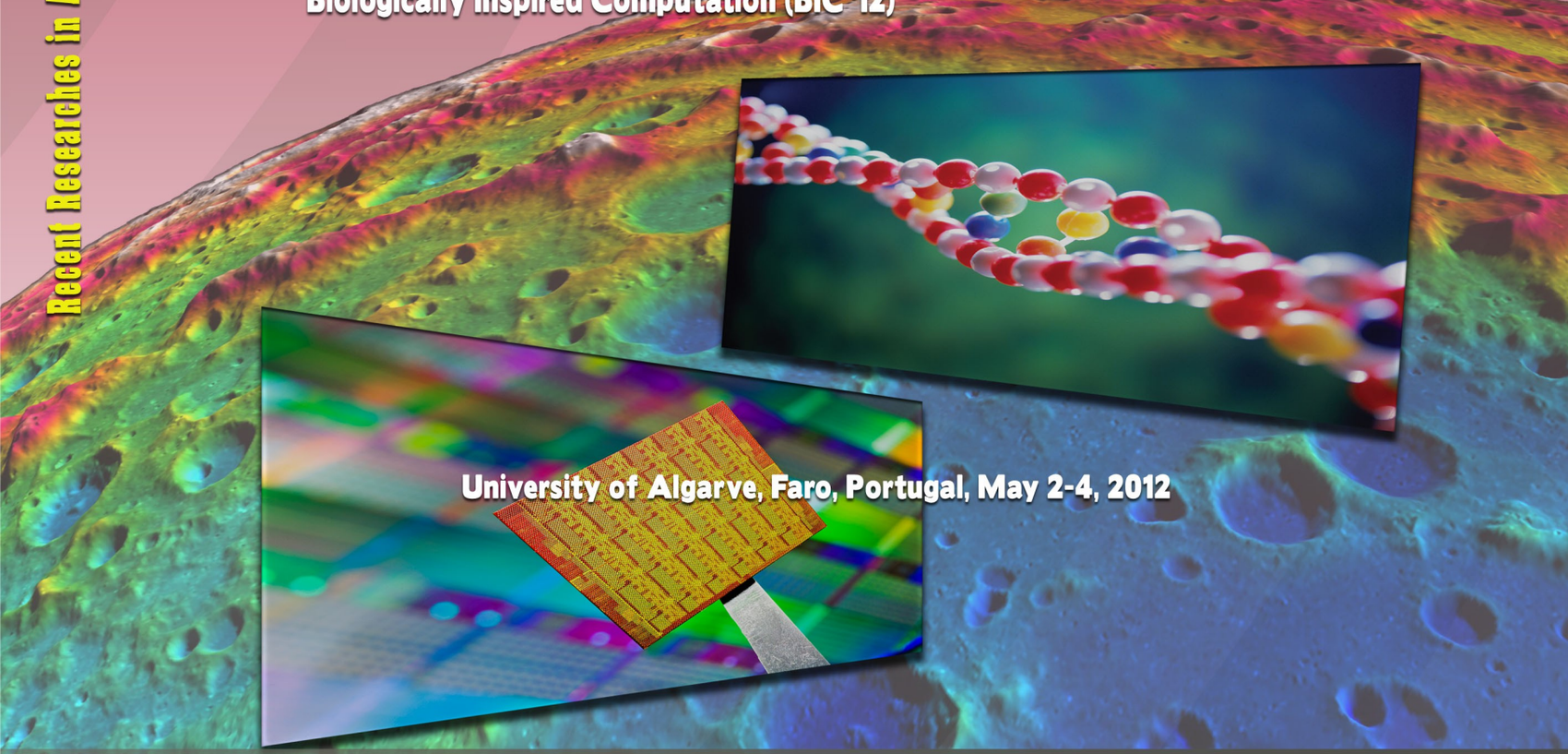
Recent Researches in Applied Information Science

- Proceedings of the 5th WSEAS World Congress on Applied Computing Conference (ACC '12)
- Proceedings of the 1st International Conference on Biologically Inspired Computation (BIC '12)



University of Algarve, Faro, Portugal, May 2-4, 2012

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Published by WSEAS Press
www.wseas.org

ISSN: 1790-5109
ISBN: 978-1-61804-089-3

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

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World Scientific and Engineering Academy and Society

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Preface

This year the 5th WSEAS World Congress on Applied Computing Conference (ACC '12) and the 1st International Conference on Biologically Inspired Computation (BIC '12) were held at the University of Algarve, Faro, Portugal, May 2-4, 2012. The multiconference provided a platform to discuss programming languages, software engineering, computer graphics, computer vision, computer networks, databases, information retrieval, data mining, genetic algorithms, immune system, bioinformatics, cognitive modeling 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 multiconference 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

People, Automation, and Complexity Concerns Affecting Enterprise Information Integration

Dr. Ionel Botef
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Abstract: Studies show that enterprise information integration faces complex organisational, technical, and social shortcomings. As a result of these shortcomings, Computer Integrated Manufacturing (CIM), concerned with the integration of commercial, financial, and engineering systems, was merely applied to integration of data, communication, and processes, and a fully computerised integration in the manufacturing system was considered unlikely to be the main model in the near future. Therefore, the purpose of this plenary lecture is to explore how people, automation, and complexity can be effectively and successfully integrated into a manufacturing enterprise information system. Based on the research's qualitative findings supported by authorities, evidence, or logic, essentially, it is argued that the enterprise information integration system development should be a multi-perspective activity focused on a variety of interdisciplinary research areas that should focus, incorporate, and assist the human operator, and that the wisdom of simplicity in order to control complexity should prevail against the attempt to develop complex systems that usually are a consequence of unnecessary requirements. This exploration also leads to the need for an enterprise information architecture framework for problem solving that should be aligned with the business practices and the ways in which the companies are run, and which finally leads to a system of systems which is architectural-centric, process-centric, human-centric, and in line with the IT infrastructure trends.

Brief Biography of the Speaker: Ionel Botef graduated in 1977 from the Polytechnic Institute of Bucharest, Romania, with a Masters in Mechanical and Manufacturing Engineering. In the 1980s he worked as a senior engineer with Turbomecanica, a manufacturer of aircraft engines, where, for example, he coordinated the technology for SPEY 512-14 DW aircraft engine, a cooperation programme with Rolls-Royce, UK. In the 1990s he moved to South Africa where he achieved his PhD from the Electrical and Information Engineering, University of the Witwatersrand, Johannesburg. From 1998 he has been a full time academic with the School of Mechanical, Industrial, and Aeronautical Engineering, University of the Witwatersrand, Johannesburg. His research interests focus on interdisciplinary research that include company integration, information systems, manufacturing processes and systems, materials science, software engineering, and computational techniques.

Plenary Lecture 2

On Some General Computation Schemes and Hybrid Optimization Techniques used in Learning Processes

Professor Dana Simian
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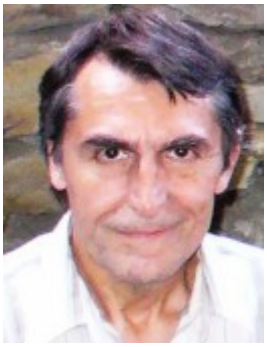
Abstract: The aim of this presentation is to introduce two general schemes used in learning processing. The first one is a generic reinforcement scheme and the second one a scheme for building SVMs kernels. Both schemes are parameters dependent and the improvement of their computational performances is dependent on the choice of these parameters. In the case of the generic reinforcement scheme the performance is measured in number of iterations in learning process and in the case of SVM kernels in the classification accuracy and cross-validation accuracy obtained during many classification tasks. Different kind of genetic algorithms are used for learning parameters optimization.

Brief Biography of the Speaker: Dana Simian received the diploma. in engineering from the University of Sibiu, Romania, the diploma in Mathematics - Informatics from the University Babes-Bolyai of Cluj-Napoca, Romania and the Ph.D. from Babes-Bolyai University of Cluj- Napoca, Romania. She graduated many courses in Computer Science. She has a great experience in algorithms and numerical methods for modelling and optimization. She published 15 books, more than 60 articles and participated in the editorial board of many scientific publications (proceedings of international conferences and journals).
She organized many special sessions within WSEAS conferences and other international workshops and international conferences on topics related to modeling of intelligent systems, approximation and optimization. She was member of many scientific committees of international conferences. She was involved as director of many research grants.

Plenary Lecture 3

Parallel Processing of Infrared Images Processing in Thermo Vision Systems



Professor Alexander Bekiarski
Technical University of Sofia
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Abstract: Thermo vision are used in military, police custom traffic control, industrial and other specific applications for collecting and processing thermo visual information from infrared images. The problems arise in the steps of implementation of the developed methods and algorithms in real time practical applications of thermo vision systems. In surveillance and security thermo visual systems one of the most practical goals is the moving objects detection and tracking in infrared images captured from a thermo vision camera. The input infrared images are usually separated and processed in small blocks with an appropriate and chosen shape (for example rectangular) and size (for example 8x8). In conventional hardware or software implementation of infrared image processing algorithms the blocks are processed consecutively or in series and the achieving the real time processing is not always possible. The advances in powerful parallel computer graphics and image processing for computer vision and computer games applications with the developed graphical processing unit (GPU) and Compute Unified Device Architecture (CUDA) offers for GPU-based computing a powerful development framework integrated with high level parallel programming languages like C or C++ languages. Graphical processing units (GPU) are devices designed to exploit parallel shared memory-based floating-point computation. They provide memory access speeds superior to those of commodity CPU-based systems. These features to update in parallel the model variables every iteration compared to other solutions like programmable logic, integrated circuits, custom shared memory solutions, and cluster message passing computing systems make GPUs attractive in real time image processing and especially in this article for infrared image processing applications. Here is proposed to exploit the ability of parallel processing and the high-speed memory access of graphical processing units (GPU), which is essential in the real time applications with neural networks in most of the infrared image processing applications. In most applications of infrared image processing with neural networks the processed algorithms work sequentially by a CPU, which means only one neuron is updated at a given time. As a result the performance degrades quickly with the increase in network size and connectivity. This is especially the case for large connectivity, since sequential processors need to iterative over every connection for each neuron. To speed up the operation, supercomputers or distributed computers are normally used for large-scale neural network simulation. But these solutions incur high cost. Traditional CPU architectures are not designed for parallel processing. To avoid this problem in real time infrared image processing applications a suitable type of neural network is proposed to use the spiking neural network (SNN) implemented in graphical processing unit (GPU) and Compute Unified Device Architecture (CUDA). The example is presented for real time infrared image processing applications like moving objects detection and tracking in infrared images in surveillance and security thermo visual systems.

Brief Biography of the Speaker: Born in 1944, Plovdiv, Bulgaria. He received M.S. degree in Communications in 1969 in Technical University, Sofia. Ph. D in Television and Image Processing in 1975, Assoc. Prof. since 1987 in the same University. Vice-Dean of Faculty on Life-Long Learning Center since 2005, Vice-Dean of French Language Faculty of Electrical Engineering since 2006. The author over 200 research papers in Image Processing Systems Thermal and Infrared Image Processing, Pattern Recognitions, Neural Networks etc. Currently the leader of courses in Basic of Television, Television Systems, Theory of Coding, Digital Signal Processors etc. His scientific iterests encompass Video and Audio Processing, Digital TV, Neural Networks, Artificial Intelligence in Video and Audio, Artificial Intelligence Programming Languages Lisp Prolog, Expert Systems, Robotics Camera Eye and Microphone Arrays, Signal Processors, Embedded Systems, Microcontrollers, Programming Languages C++, Java, Matlab etc.