Editors

Ognian Nakov
Plamenka Borovska
Abelha Antonio
Valeri Mladenov
Lyudmila Zinchenko
Alejandro Fuentes-Penna

Associate Editors

Miroslav Voznak
Vladimir Vasek
Antoanela Naaji

Recent Advances in Computer Science

Proceedings of the 17th International Conference on Computers (part of CSCC '13)

Proceedings of the 1st International Conference on Artificial Intelligence and Cognitive Science (AICS '13)

Proceedings of the 1st International Conference on Innovative Computing and Information Processing (INCIP '13)

Rhodes Island, Greece, July 16-19, 2013

Scientific Sponsors

Recent Advances in Computer Science

RECENT ADVANCES in COMPUTER SCIENCE

Proceedings of the 17th International Conference on Computers (part of CSCC '13)
Proceedings of the 1st International Conference on Artificial Intelligence and Cognitive Science (AICS '13)
Proceedings of the 1st International Conference on Innovative Computing and Information Processing (INCIP '13)

Rhodes Island, Greece
July 16-19, 2013

Scientific Sponsors:

Technical University of Sofia, Bulgaria

Polytechnic University of Bari, Italy

University Politehnica of Bucharest, Romania

Recent Advances in Computer Engineering Series | 14

ISSN: 1790-5109
ISBN: 978-960-474-311-7

RECENT ADVANCES in COMPUTER SCIENCE

Proceedings of the 17th International Conference on Computers (part of CSCC '13)
Proceedings of the 1st International Conference on Artificial Intelligence and Cognitive Science (AICS '13)
Proceedings of the 1st International Conference on Innovative Computing and Information Processing (INCIP '13)

Rhodes Island, Greece
July 16-19, 2013

Published by WSEAS Press
www.wseas.org

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

ISSN: 1790-5109
ISBN: 978-960-474-311-7

RECENT ADVANCES in COMPUTER SCIENCE

Proceedings of the 17th International Conference on Computers (part of CSCC '13)
Proceedings of the 1st International Conference on Artificial Intelligence and Cognitive Science (AICS '13)
Proceedings of the 1st International Conference on Innovative Computing and Information Processing (INCIP '13)

Rhodes Island, Greece
July 16-19, 2013

Michaela Stanickova
Muhammad Zakarya
Rajveer Mittal
Pavel Varacha
Massimiliano Todisco
Álvaro Santos
Claudia-Georgeta Carstea
Ming-Shen Jian
Yang Zhang
Manuela Panoiu
Rijiv Kumar
Mihai Tiberiu Lates
Giovanni Aiello
Varun Menon
Menaka Sivakumar
Calbureanu Popescu Madalina Xenia
Kevin Kam Fung Yuen
Harry Coomar Shumsher Rughooputh
Daniela Litan
Kandarpa Kumar Sarma
Mueen Uddin Awan
Mihai Timis
Alina Adriana Minea
Santhosh Kumar B. B.
Diego Pinto Roa
Hung-Jen Yang
Mahesh Chavan
Aw Yoke Cheng
Mioara Chirita
Muntean Mihaela
Ismail Rakip Karas
Yixin Bao
Vipul Arvindbhai Shah
Yuqing Zhou
Gandolfo Dominici
Alicia Y. C. Tang
Philippe Fournier-Viger
Jianqinag Gao

Table of Contents

Keynote Lecture 1

A Formal Study of the Data Dependence Analysis Tests in Parallel Computing

Professor Kleanthis Psarris
School of Natural and Behavioral Sciences
City University of New York - Brooklyn College
Brooklyn, NY 11201
Email: kpsarris@brooklyn.cuny.edu

Abstract: Optimizing compilers rely upon data dependence analysis to reveal the ordering constraints among statements in a program that need to be preserved in order to produce valid optimized and parallel code. Testing array references for data dependence is equivalent to determining the existence of integer solutions to a system of equalities and inequalities. A number of data dependence tests have been proposed in the literature. In each test there are different tradeoffs between accuracy and efficiency. In this work we study the fundamental relationships between several data dependence tests. We consider the Banerjee Extreme Value test, Fourier Motzkin Variable Elimination (FMVE), the I-Test, and the Omega test, which are representative of the state of the art in data dependence analysis. The Banerjee Extreme Value test and FMVE can only determine the existence of real solutions to a system. Thus they can only disprove, but not prove, data dependence. The I-Test and the Omega test refine the Banerjee Extreme Value test and FMVE, respectively, to the integer domain and can prove data dependence. The Omega test is a more accurate data dependence test, but with worst case exponential time complexity. The I-Test is a polynomial time test, but it is not always conclusive. We first show that FMVE is equivalent to the Banerjee Extreme Value test. We then show that the Omega test's technique to refine FMVE to integer solutions (dark shadow) is equivalent to the I-Test's refinement of the Banerjee Extreme Value test to integer solutions (the accuracy condition). We finally prove that the I-Test returns an inconclusive (“maybe”) answer if and only if the Omega test requires an exponential time exhaustive search to produce an exact answer (the so-called “Omega Test Nightmare”).

Brief Biography of the Speaker: Kleanthis Psarris is a Professor of Computer and Information Science and the Dean of the School of Natural and Behavioral Sciences at City University of New York - Brooklyn College. He received his B.S. degree in Mathematics from the National University of Athens, Greece in 1984. He received his M.S. degree in Computer Science in 1987, his M.Eng. degree in Electrical Engineering in 1989 and his Ph.D. degree in Computer Science in 1991, all from Stevens Institute of Technology in Hoboken, New Jersey. His research interests are in the areas of Parallel and Distributed Systems, Programming Languages and Compilers, and High Performance Computing. He has designed and implemented state of the art program analysis and compiler optimization techniques and he developed compiler tools to increase program parallelization and improve execution performance on advanced computer architectures. He has published extensively in top journals and conferences in the field and his research has been funded by the National Science Foundation and the Department of Defense. He is an Editor of the Parallel Computing journal. He has served on the Program Committees of several international conferences including the ACM International Conference on Supercomputing (ICS) in 1995, 2000, 2006 and 2008, the IEEE International Conference on High Performance Computing and Communications (HPCC) in 2008, 2009 and 2010, and the ACM Symposium on Applied Computing (SAC) in 2003, 2004, 2005 and 2006.

Plenary Lecture 1

Data Structures for Fast Information Retrieval

Professor Václav Skala
Fellow of the Eurographics Association
Center of Computer Graphics and Visualization
Department of Computer Science and Engineering
Faculty of Applied Sciences
University of West Bohemia
&
Department of Computer Science
Faculty of Electrical Engineering and Computer Science
VSB-Technical University of Ostrava
Czech Republic
E-mail: skala@kiv.zcu.cz

Abstract: Data structures play a significant role in information retrieval usually only the speed and memory consumption are considered. In storing and retrieval sequential, tree based, direct or indexed data structures are mostly used. However they are efficient for some kind of queries, while for other queries they are quite inefficient. Data structures are mostly oriented to textual data, while geometrical data are not often considered. Textual data can be formed by very long strings (the longest word has 189 819 characters - the largest protein – titin; the longest word used in printed text has been 1 909 characters), while geometrical data have “unlimited” interval values (mostly a floating point representation is used) by definition.
We will present selected fundamental data structures and their modifications. We will introduce a new data classification and newly developed data structures convenient for storing and retrieval of both basic data types textual and geometrical as well.
We will present a unifying approach, i.e. for textual and geometrical data, leading to development of new data structures for processing of geometrical and textual large data sets convenient for distributed processing as well. The proposed data structures have been extensively tested for textual and geometrical large data sets and experimental result will be presented.

Brief Biography of the Speaker: Prof. Vaclav Skala is a Full professor of Computer Science at the University of West Bohemia, Plzen and VSB-Technical University Ostrava, Czech Republic. He received his Ing. (equivalent of MSc.) degree in 1975 from the Institute of Technology in Plzen and CSc. (equivalent of Ph.D.) degree from the Czech Technical University in Prague in 1981. In 1996 he became a full professor in Computer Science. In 1997 the Center of Computer Graphics and Visualization (CCGV) was formally established and since then he is the Head of the CCGV in Plzen (http://Graphics.zcu.cz).
Prof.Vaclav Skala is a member of editorial of The Visual Computer (Springer), Computers and Graphics (Elsevier), Machine Graphics and Vision (Polish Academy of Sciences) and the Editor in Chief of the Journal of WSCG. He is a member of several international program committees of prestigious conferences and workshops. He is a member of ACM SIGGRAPH, IEEE and Eurographics Association.
Prof.Vaclav Skala has published over 200 research papers in scientific journal and at international conferences. His current research interests are computer graphics, visualization and mathematics, especially geometrical algebra, algorithms and data structures.
Details can be found at http://www.VaclavSkala.eu

Plenary Lecture 2

Jet Noise Simulations Utilizing Petaflop Computing

Professor Anastasios (Tasos) Lyrintzis
Distinguished Professor and Chair
Aerospace Engineering
Embry-Riddle Aeronautical University
Daytona Beach, FL, USA
E-mail: lyrintzi@erau.edu

Abstract: Processing speeds and memory limitations of existing supercomputers limit the faithfulness of many simulations. Thus these simulations are not accurate enough to allow design and optimization of important devices. In order to simulate realistic situations very fine grids (e.g. on the order of tens of billions of points) are sometimes needed, requiring petascale computing systems. Thus new efficient algorithms are needed as well as implementation strategies that take advantage of the main characteristics of petascale architectures. One problem that can benefit petaflop computing is jet noise simulation. Jet noise is an important issue due to increased commercial air-traffic, penalty fees for noisier aircraft, and future stringent noise regulations as well as military operational requirements. Simulation of realistic conditions requires tens of billions of grid points. An efficient petascalable code has been developed based on the large eddy simulation (LES) technique is designed and implemented to simulate faithfully subsonic jet noise. Examples of large-scale simulations using up to 1 billion grid points will be given and scalability studies will be shown for up to 91,125 cores (or a theoretical speed of ~ 1 petaflop/s). It is believed that the more accurate simulations will increase our level of understanding of jet noise and pave the way for quieter designs.

Brief Biography of the Speaker: Dr. Lyrintzis joined ERAU in January of 2012 as a Distinguished Professor and chair of the Department of Aerospace Engineering. He was Purdue (1994-2011) after serving seven years on the faculties of University of Minnesota (1989-94), Cornell (1988-89) and Syracuse University (1987-88). At Purdue he was School of Aeronautics and Astronautics Associate Head for graduate programs and the Director of Purdue's Computational Science and Engineering (CS&E) interdisciplinary program. Dr. Lyrintzis' primary research interests are in the area of fluid dynamics with emphasis on numerical methods and applications in aero-acoustics. His research endeavors are currently supported by NSF, NASA, the US Navy. He has co-authored about 60 journal papers and more than 100 conference papers. He has advised or co-advised 16 Ph.D. and 18 M.S. students. Dr. Lyrintzis is an AIAA Associate Fellow, an ASME Fellow, and a Boeing Welliver Fellow. He has been a member of the AIAA Aero-acoustics Technical Committee (vice-chair '05-07, chair '07-09), the AHS Acoustics Committee, and the ASME Coordinating Group for CFD. He is currently an Associate editor for the AIAA Journal and the International Journal of Aero-acoustics. Finally, Dr. Lyrintzis has participated in the development of award-winning (American Helicopter Society, Howard Hughes Award, NASA Group Achievement Award) TRAC (Tilt-Rotor Aeroacoustic Codes) system of codes from NASA Langley.

Plenary Lecture 3

Multilingual and Crosslingual Meaning of Verb Prefixes


Assistant Professor Nives Mikelic Preradovic
Professor Damir Boras
Faculty of Humanities and Social Sciences
University of Zagreb, Croatia
E-mail: nives.mikelic@gmail.com

Abstract: Multilingual dictionaries and parallel text corpora provide a powerful means for discovering the shared linguistic knowledge across languages. One of the phenomenathat has been revealed in many languages (English, Italian, Russian and especially German), but still not treated cross-linguistically,is the close relationship between the verbal aspect and Aktionsart (a syntactic-semantic category covering the manner of action, action type, verbal character or aspectual character) as well as the fact that both the aspect and Aktionsart are result of the derivational process. For the proper interpretation of Aktionsart in any language, the function of prefix in the derived verb is the mostimportant: if the prefix exhibits the function of semantic modification, then it signifies Aktionsart of the derived verb, causing the change of verbal aspect as well. In our recent research we discovered the unique semantic features of verb prefixes in Croatian and captured them in the Croatian verb valency lexicon CROVALLEX. The syntactic and semantic connection between base verbs and derived prefixed verbs was revealed and modeled as rules which contribute to the enrichment of the CROVALLEX lexicon. We analyzed all productive derivational verb prefixes in Croatian and proved that the prefix entails not only the change in the verbal aspect, but, more importantly, the change in the lexical meaning of the verb, the change in valency frame (both the number of arguments and the surface forms) as well as the syntactic-semantic class.We proved that the process of prefixation establishes connection between different base verbs that start to share the same semantic feature due to the prefix attached. Furthermore, when determining the typology of semantic features of each productive prefix in Croatian we realized that the features implicated by prefixation usually mean temporality (inchoative, punctuative, durative, iterative), locativeness, direction (adlative, ablative, perlative), dimension (intensive, diminutive), state change (resultative, mutative), transformativity, distribution, comitativity, etc. Our future step is to discover the possibility for the automatic cross-linguistic transfer of these semantic features from Croatian to Latin, Italian and German (as well as vice versa), using available digital texts of bilingual and multilingual dictionaries(digitized in the Croatian Dictionary Heritage and Croatian European Identity projector collected from free Internet sources). As a result, we plan to capture the semantic parameters of verb classes in each language that unify verbs with a certain syntactic and semantic behavior, proving the possibility to generalize the knowledge of the cross-linguistic transfer to acquire the syntax and semantics of verbs in all four languages. Research questions posed here will reveal if there is a possibility to extract the specific semantics and function of verb prefixes cross-linguistically, providing a framework for the description and comparison of individual languages. We believe that our present work sets markers for the future research, but also determine the Croatian share in the European language diversity.

Brief Biography of the Speaker:
Nives Mikelić Preradović is assistant professor at the Department of Information Sciences, Faculty of Humanities and Social Sciences, University of Zagreb. She obtained her MA in Croatian language and literature and Information sciences at the University of Zagreb andher MPhil in Natural Language Processing at Cambridge University, UK. She obtained her PhD in 2008 at the Zagreb University on the development of the Croatian Valency Lexicon – Crovallex and accentual-derivational models for Croatian nouns and adjectives as well as accentual-conjugational model for verbs. In 2006 she spent a semester doing teaching and research at Georgetown University, USA. Her general research interests include developing multilingual valency lexicon ofverbs and nouns, syntactic/semantic classification of verbs and nouns, morphosyntactic annotation, sentiment analysis (opinion mining), computer-assisted language learning and text summarization. She participated in several international and national projects: ACCURAT (Analysis and evaluation of Comparable Corpora for Under Resourced Areas of machine Translation), CESAR (CEntral and South-east europeAn Resources), Abu-MaTran (Automatic Building of Machine Translation), Typology of Knowledge and Information Processing Methods and Design and Management of Public Knowledge in

the Information Space. She published a book, 10 book chapters and about 30 scientific papers in international journals and conference proceedings, part of them in WSEAS conferences.

Damir Boras is full professor with tenure at the Department of Information Sciences and the dean of the Faculty of Humanities and Social Sciences, University of Zagreb. He is the head and the founder of the Chair for lexicography and encyclopaedic science at the Department of Information and Communication Sciences. His main recent research interests are dictionary heritage and dictionary knowledge presentation, linguistic databases, computer assisted language learning, morphosyntactic annotation, terminology extraction and building multilingual valency lexicon of verbs and nouns as well as service learning. He has been principal investigator or research team member in many projects related to the application and introduction of the information technology, high and elementary education, publishing and jurisdiction (Sources for Croatian Heritage and Croatian European Identity, Croatian Dictionary Heritage and Croatian European Identity, Croatian dictionary heritage and dictionary knowledge presentation etc.). He conductes several courses at graduate and postgraduate level of the Information Science studies. Furthermore, he published more than 60 scientific and professional papers, textbooks and manuals and more than 30 reports in international and domestic scientific congresses in the field of information and communication sciences, text and natural language processing, lexicography and encyclopaedia. He is a member of many committees and boards (Committee for Science, Education and Culture of the Croatian Parliament, Board of the National Center for External Evaluation of Education, National Scientific-field board for Social sciences at the National board for science, etc.).

Plenary Lecture 4

Multi-Agent Systems in Game Based e-Learning

Professor Dana Simian
Faculty of Sciences
University Lucian Blaga of Sibiu
Romania
E-mail: dana.simian@ulbsibiu.ro

Abstract: Game Based Learning is a method that promises long-term results and opens new possibilities in e-learning approaches. The current technology offers a solid base for most programmers and educators to develop in this direction. Digital Game Based Learning becomes a challenge opposed to board, card or class games. The aim of this presentation is tointroduce a model of an adaptivemulti-agentsystem integrated into a game based e-learning system. The game environment is used to realize a dynamic allocation of educational puzzles. The game in which the multi agent system is integrated is an educational FPS where you progress by properly resolving informatics problems inserted into the game flow. The aim is to design an autonomous system which realizes dynamic puzzle and quests allocation, choosing the progress of the game based only on the player's choices. The proposed system is based on the adaptive wasp colonies behaviour.The adaptive behavior of such a system is necessary in order to create a unique multiplayer mode where the game designers no longer need to worry for the educational content, they will only create the triggers in the world and the wasp agents will take care of the rest. Thedominance hierarchy in the wasp model ensures a balanced gameplay and learning.

Brief Biography of the Speaker: Dana Simian received the diploma. in engineering from the University of Sibiu, Romania, the diploma. in Mathematics 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, and in machine learning. She published 16 books, more than 60 articles and participated in the editorial board of more than 22 scientific publications (proceedings of international conferences). She organized 8 special sessions within international conferences, 2 international workshops and many international conferences on topics related to algorithms and computational techniques in modeling, approximation and optimization. She is member of many international scientific committees. She is reviewer of many scientific publications.

Plenary Lecture 5

Semantic Networks for Natural Language Processing Applications

Assistant Professor Velislava Stoykova
Bulgarian Bulgarian Academy of Sciences
Institute for Bulgarian language
Sofia, Bulgaria
E-mail: vstoykova@yahoo.com

Abstract: Semantic Networks (SN) are widely used for Knowledge Representation tasks in Artificial Intelligence frameworks. However, recently they became to be used for resolving various problems in Natural Language Processing (NLP) frameworks. SN are successfully used also for representing grammar knowledge at the level of syntax, morphology and phonology. At the same time, they are widely used for representing lexical knowledge for different linguistic tasks including for terminology. In our talk, we are going to present and analyze some basic and most important types of computational implementations of SN in above directions and we will discuss them with respect to their multilingual applications.

Brief Biography of the Speaker: Assist. Prof. Dr. Velislava Stoykova has received her MA degree from Sofia University. In 2004 she has received a PhD in computational linguistics. Her major areas of interest are: language modelling, natural language processing, computational lexicography, e-learning. From 1990 till 1995 she worked at Bulgarian Academy of Sciences, Institute for Parallel Processing as a programmer. At 1995 she joined the research team of the Institute for Bulgarian Language of Bulgarian Academy of Sciences as a researcher. From 2011 she works at the Bulgarian Academy of Sciences, Institute for Bulgarian language as an assistant professor. Assist. Prof. Dr. Stoykova has one book, more than 30 published papers in international conference proceedings and scientific journals, and is a co-author of three dictionaries. She is a member of the research team at the Institute for Bulgarian Language and had worked on many research projects (national and international) as a member of the research team and as a project leader. Assist. Prof. Dr. Stoykova is a member of Bulgarian Lexicographic Society and a member of Bulgarian Artificial Intelligence Association.

Plenary Lecture 6

Image Processing and Recognition for Human Identification. Biometrics and Forensic Applications

Professor Ryszard S. Choraś
Institute of Telecommunications
Department of Telecommunications and Electrical Engineering
University of Technology and Life Sciences
Bydgoszcz
POLAND
E-mail: choras@utp.edu.pl

Abstract: This lecture is a survey on biometrics and forensics, especially methods of image processing and recognition for human identification. A biometric system is a pattern recognition system that recognizes a person on the basis of a feature vector derived from a specific physiological or behavioral characteristic that the person possesses.
All biometric systems work in a similar fashion:
-The user submits a sample that is an identifiable, unprocessed image or recording of the physiological or behavioral biometric via an acquisition device,
-This image and/or biometric is processed to extract information about distinctive features.
Biometric systems have four main components: sensor, feature extraction, biometric database, matching-score and decision-making modules. The input subsystem consists of a special sensor needed to acquire the biometric signal. Invariant features are extracted from the signal for representation purposes in the feature extraction subsystem. During the enrollment process, a representation (called template) of the biometrics in terms of these features is stored in the system. The matching subsystem accepts query and reference templates and returns the degree of match or mismatch as a score , i.e., a similarity measure. A final decision step compares the score to a decision threshold to deem the comparison a match or non-match.
The processes of forensic computing can be divided into three main areas:
-Image Capture - The Imaging process is fundamental to any computer investigation.
-Image Processing - The processing software to extract features of the target image.
-Investigation.
Distinctions between biometrics and forensic are based on the fact that biometrics methods are implemented on live subjects. Techniques designed for person identification in biometrics can be utilized for forensic purposes.
Automated biometrics-based personal identification systems can be classified into two main categories: identification and verification.
The personal attributes used in a biometric identification system can be physiological, such as facial features, fingerprints, iris, retinal scans, hand and finger geometry; or behavioral, the traits idiosyncratic of the individual, such as voice print, gait, signature, and keystroking.
In this paper a recognition methods are presented for recognizing a person on the basis of a feature vector derived from a biometrics templates/images.

Brief Biography of the Speaker: Prof. Ryszard S. Choraś is currently Full Professor in the Institute of Telecommunications of the University of Technology & Life Sciences,Bydgoszcz, Poland. His research experience covers image processing and analysis, image coding, feature extraction and computer vision.
At present, he is working in the field of image retrieval and indexing, mainly in low- and high-level features extraction and knowledge extraction in CBIR systems. He is the author of Computer Vision. Methods of Image Interpretation and Identification (2005) and more than 163 articles in journals and conference proceedings.
He is the member of the Polish Cybernetical Society, Polish Neural Networks Society, IASTED, and the Polish Image Processing Association. Professor Choras is a member of the editorial boards of MachineVision and Graphics,

International Journal of Biometrics (IJBM), International Journal of Biology and Biomedical Engineering, Recent Patents On Signal Processing (Bentham Open). He is the editor-in-chief ofWSEAS Transaction on Signal Processing Journal, Image Processing and Communications, An International Journalandassociate editor-in-chief Computer Science Journals (CSC Journals) Image Processing (IJIP).

He is also the chairman of the Image Processing and Communications Conference (2009, 2010, 2011, 2012, 2013) and editor books Image Processing and Communications Challenges published in Advanes in Intelligent Systems and Computing Springer Verlag Series.

He has served on numerous conference committees, e.g., as Visualization, Imaging, and Image Processing (VIIP) , IASTED International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA) and International Conference on Computer Vision and Graphics in Warsaw, ICINCO\ICATE Conference.

Plenary Lecture 7

Recent Advances in Speech Quality Assessment

Associate Professor Miroslav Voznak
Department of Telecommunications
Faculty of Electrical Engineering and Computer Science
VSB-Technical University of Ostrava
Czech Republic
E-mail: voznak@ieee.org

Abstract: This keynote will deal with new approaches to speech quality assessment, especially with non-intrusive methods which are suitable for speech quality evaluation in real-time communication. The first part will discuss conventional models of objective speech quality assessment based on evaluation of signals in time-frequency domain. This way is applied in algorithms such as PESQ (Perceptual Evaluation of Speech Quality) or recently standardized POLQA (Perceptual Objective Listening Quality Assessment). The second part of the keynote speech will deal with an intrusive approach known as E-model andwith proposal of the original E-model modification. The new model includes improvements giving more precise results when a jitter is present in transmission channel. The idea is based on the fact that the network jitter can affect overall delay in delivery or a packet loss due to a limitation of play-out buffer in IP phones or VoIP gateways. Delay is incorporated in an impairment factor Id of E-model whereas losses are issue of Ie-eff parameter in E-model. There will be presented how the estimated speech quality is affected by jitter and the computed results in E-model will be compared with values gained by PESQ objective intrusive method. The last part will discuss a practical implementation of computational E-model in BESIP (Bright Embedded Solution for IP telephony) where a monitoring module has been implemented, the BESIP consists of four modules and the speech quality assessment is a part of one of them. In order to verify suitability of the applied method in Monitoring module, a comparison to the objective intrusive PESQ method was carried out. In addition to this module, the entire concept of BESIP project will be introduced and a roadmap of next development.

Brief Biography of the Speaker: Miroslav VOZNAK (born in 1971) is an Associate professor with Department of Telecommunications, VSB-Technical University of Ostrava. He received his M.S. and Ph.D. degrees in telecommunications, dissertation thesis “Voice traffic optimization with regard to speech quality in network with VoIP technology” from the VSB-Technical University of Ostrava, in 1995 and 2002, respectively. Topics of his research interests are Next Generation Networks, IP telephony, speech quality and network security. He is a member of INDECT team conducted by AGH University of Science and Technology in Cracow (7 FP EU project 2009-2013 under Grant Agreement No. 218086), the purpose of the INDECT project is to involve European scientists and researchers in the development of solutions to and tools for automatic threat detection. He is also a member of team Softcomputing involved in IT4Innovations, Czech National Centre ofExcellence in Ostrava. He is author or co-author more than 200 results indexed in Czechnational database of Research, Development andInnovations, single author more than 70 of them and three college books. Miroslav Voznak is also author or co-author more than 50 results indexed in SciVer SCOPUS in last five years, with more than 100 citations and h-index = 6and about 400 registered citations in Google Scholar with h-index=10 in last five years.He is in editorial boards of several journals such as “Radioengineering“, “Embedded and Distributed Systems“ and“Advances in Electrical andElectronic Engineering“. Since 2013 he also has served as department chair of Dpt. of Telecommunications in VSB-Technical University of Ostrava.

Plenary Lecture 8

The Cognitive Action Cycle in Artificial Intelligence Guided Control Systems

Professor Wolfgang Baer
Emeritus Professor of Information Sciences, Code IS
Naval Postgraduate School
Monterey, CA
USA
E-mail: Baer@nps.ed

Abstract: The best working hypothesis for Intelligence in humans is represented by a cycle of activity which converts a description of sensory stimulation into memory based models of their physical causes and then uses such models to predict the arrival of expected sensory stimulation. When expectations match actuallyreceived stimulation the cycle stabilizes and thereby contains thebest knowledge of the world that the system can calculate from itssensory experience. This talk will discuss the implementation of suchcognitive feedback cycles in computer systems as a mechanism forimplementing artificial intelligence and compare such implementationswith actual intelligence believed to exist in human beings.The presentation will present the architecture offeedback algorithms and the potential for utilizing our investment inmodels, games, and simulations with real time database updatingalgorithms to close the artificial cognitive activity cycles and buildsubstantially more powerful real-time control systems for use ingeneral field environments. We will discuss the throughput and computepower requirements for a variety of applications and specificallydiscuss the development and experiments conducted at the NavalPostgraduate School for real-time Unmanned Aerial Vehicle imageanalysis and mission control. Advanced topics discussed will include1) the use of dual-eye input devices to perform real-time live virtualimage comparisons to drive terrain database update functions, 2)modeling the real world by running interacting activity cycles incomputer networks, and the developing potential of quantum computersto run parallel feedback loops at speeds that are needed to matchhuman capacities.

Brief Biography of the Speaker: Dr. Wolfgang Baer received his Ph.D. in Physics from theUniversity of California at Berkeley. He worked at Ford Aerospace as amission analyst for meteorological and communication satellites beforestarting a company to develop computer graphics and simulationsoftware. Dr. Baer has run a multi million dollar simulationdevelopment laboratory for the US Army at Ft. Ord California, writtenlarge image and graphics software applications, and directly managedsoftware development teams of seven to ten people to develop realworld modeling applications.Dr. Baer currently holds a research position at the NavalPostgraduate School in Monterey California. Teaching courses innetwork and network programming and quantum information systems. Heis using high speed low cost networked processors to integrate computeintensive real time video realistic battlefield simulation and rapidterrain data base creation algorithms into battlefield knowledgesystems. Dr. Baer is the primary author of the Perspective ViewNascent Technologies (PVNT) software package with which he pursuesunmanned aerial vehicles mission control, cognitive visioninterpretation. His interest in cognitive brain functions has lead toseveral publications exploring the physics of consciousness, realintelligence, and research applications directed toward theextension of cognitive brain capability beyond its normal limits. Hislatest research in Dual-Eye Input systems addresses the question, "Why are we wasting two eyes on one computer screen?".