

„Lucian Blaga” University of Sibiu, Romania
Faculty of Sciences
Department of Mathematics and Informatics

MDIS 2015 - SIBIU

**Fourth International Conference on
Modelling and Development of Intelligent Systems**

October 28 – November 1, 2015
Sibiu, Romania

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Editor: Lecturer Cristina Răulea

PREFACE

The aim of the conference is to bring together computer scientists, mathematicians, researchers and students working in fields which can be connected with modelling and development of intelligent systems.

The topic of the conference includes but is not limited to the following subjects:

- Evolutionary computing
- Grid computing and clustering
- Data mining
- Ontology engineering
- Intelligent systems for decision support
- Knowledge based systems
- Pattern recognition and model checking
- Motion recognition
- Hybrid computation for artificial vision
- Knowledge reasoning for artificial vision
- Geometric modelling and spatial reasoning
- Modelling and optimization of dynamic systems
- Large scale optimization techniques
- Adaptive systems
- Multiagent systems
- Swarm intelligence
- Metaheuristics and applications
- Machine Learning
- Mathematical models for development of intelligent systems

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Specialists from Estonia, Republic of Moldova, Philippines, Romania, Serbia, United States, Ukraine came together to this fourth edition of the conference to present and to discuss recent problems on mathematical models, design, development and applications of intelligent systems.

The conference's papers were reviewed by two independent reviewers and will be published in a proceedings volume edited by Lucian Blaga University Press. The proceedings will be indexed by Mathematical Review and Zentralblatt.

Conference Chair
Prof. PhD. Dana Simian

CONFERENCE COMMITTEE

Scientific committee

- Emeritus Prof. PhD. Rus Teodor - University of Iowa, USA
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- Prof. PhD. Dejan Gjorgjevikj - „Ss. Cyril and Methodius” University, Republic of Macedonia
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- Prof. PhD. Milan Tuba - John Naisbitt University & University of Belgrade, Serbia
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- Prof. PhD. Dan Eugen Ulmet - University of Applied Sciences Esslingen, Germania
- Prof. PhD. Lubin Vulkov - University „Angel Kunchev” of Rousse, Bulgaria
- Lecturer PhD. Ralf Fabian - „Lucian Blaga” University of Sibiu, Romania
- Lecturer PhD. Florin Stoica - „Lucian Blaga” University of Sibiu, Romania

Conference chair

Prof. Univ. Dr. Dana Simian

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- Assoc. Prof. PhD. Daniela Danciulescu - University of Craiova, Romania
- PhD. Corina Simian - University of Chicago, United States of America

OFFICIAL LANGUAGE

The official language of the conference is English.

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CONFERENCE PROGRAM OUTLINE

Wednesday, October 28, 2015	
8 ⁴⁵ – 9 ³⁰	Registration (Room A18 [*])
9 ³⁰ – 9 ⁴⁵	Opening ceremony (Room A18)
9 ⁴⁵ – 10 ⁰⁰	IT companies presentation – Gemini Solutions (Room A18)
10 ⁰⁰ – 10 ³⁰	Plenary lecture - Prof. PhD. Dan Cristea, Room A18
10 ³⁰ – 11 ⁰⁰	Coffee break
11 ⁰⁰ – 12 ²⁰	Session 1, Room A18, Chairman Prof. PhD. Dana Simian
12 ³⁰	Lunch (University Canteen)
16 ⁰⁰ – 17 ²⁰	Session 2, Room A18, Chairman Prof. PhD. Milan Tuba
18 ⁰⁰	Welcome Party – University Canteen
Thursday, October 29, 2015	
9 ³⁰ – 10 ⁰⁰	Plenary lecture - Prof. PhD. Milan Tuba, Room A18
10 ⁰⁰ – 10 ²⁰	Coffee break
10 ²⁰ – 12 ²⁰	Session 3, Room A18, Chairman Prof. PhD. Dan Cristea
12 ³⁰	Lunch (University Canteen)
15 ⁰⁰ – 17 ⁰⁰	Session 4, Room A18, Chairman Lecturer PhD. Florin Stoica
18 ¹⁵	Official dinner (Restaurant Gallant ^{**})
Friday, October 30, 2015	
9 ⁰⁰ - 19 ⁰⁰	Conference trip (Itinerary: Sibiu – Turda Salina – Alba Iulia – Sibiu)

^{*} Room A18 is situated in the building of Faculty of Sciences, I. Ratiu Str, No. 5-7.

^{**} Bd. Victoriei, No. 55, Sibiu.

PAPERS PRESENTATION

Faculty of Sciences,
Sibiu, Dr. I. Rațiu Str., No. 5-7
1st Floor, Room A18

WEDNESDAY, October 28, 2015

9⁴⁵ – 10⁰⁰ IT companies presentations – Gemini Solutions

10⁰⁰ – 10³⁰ Plenary Lecture, Prof. PhD. Dan Cristea, *Discovering semantic links in texts. Corpora and projects*, „Alexandru Ioan Cuza” University of Iași, ROMANIA

Session 1 Chairman Prof. PhD. Dana Simian

11⁰⁰ – 11²⁰ *Power monitoring scheme of a net metering miniature system*, Jeffrel HERMIAS, Rashid Jull DE LUNA, Anthony Joseph LAVILLA, Marven JABIAN, Noel ESTOPEREZ, Mindanao State University, PHILIPPINES

11²⁰ – 11⁴⁰ *Contributions to the diagnosis of kinematic chain components operation by analyzing the electric current and temperature of the driving engine*, Ionel PAUNESCU, Paul Liviu PAUNESCU, Stefan VELICU, Polytechnic University of Bucharest, ROMANIA

11⁴⁰ – 12⁰⁰ *Developing internet of things - based environment smart sensing network using model view controller*, Mircea RISTEIU, Ioan ILEANA, Constantin HUTANU, Gheorghe MARC, „1 Decembrie 1918” University of Alba Iulia, ROMANIA

12⁰⁰ – 12²⁰ *Agent-based computational models implemented in 3D space*, Florentin BOTA, Dan DUMITRESCU, „Babes-Bolyai” University of Cluj-Napoca, ROMANIA

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Session 2 *Chairman: Prof. PhD. Milan Tuba*

- 16⁰⁰ – 16²⁰ *A comparative analysis of social media tools, Antoniu Gabriel PITIC, Elena Alina PITIC, Călin BUCUR, „Lucian Blaga” University of Sibiu, ROMANIA*
- 16²⁰–16⁴⁰ *Modeling of phenomena in linear elasticity using Intrinsic Finite Elements, Corina SIMIAN, University of Chicago, USA*
- 16⁴⁰ – 17⁰⁰ *Adaptive Time Discretization for Retarded Potentials, Alexander VEIT, University of Chicago, USA*
- 17⁰⁰–17²⁰ *Generating a CTL model checker using an attribute grammar, Laura F. STOICA, Florin STOICA, „Lucian Blaga” University of Sibiu, Florian Mircea BOIAN, „Babeş-Bolyai” University of Cluj-Napoca, ROMANIA*

THURSDAY, October 29, 2015

- 9³⁰ – 10⁰⁰ **Plenary Lecture Prof. PhD. Milan Tuba, *RFID Network Optimization Using Swarm Intelligence Algorithms*, John Naisbitt University, Belgrade, SERBIA**

Session 3 *Chairman Prof. PhD. Dan Cristea*

- 10²⁰ – 10⁴⁰ *Optimization of control systems by PENDULAR concept, Cătălin Nicolae CALISTRU, „Gh. Asachi” Technical University of Iași, ROMANIA*
- 10⁴⁰ – 11⁰⁰ *A continuous reformulation of the quadratic unconstrained binary optimization problem, Vasile MORARU, Sergiu ZAPOROJAN, Technical University of Moldova, REPUBLIC OF MOLDOVA*
- 11⁰⁰ – 11²⁰ *Ownership tracking system with dynamic identification of watermark patterns, Dana SIMIAN, Ralf FABIAN, „Lucian Blaga” University of Sibiu, ROMANIA*

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11²⁰ – 11⁴⁰ *New model for vertical wind speed estimation based on Lidar, sky photometry and real data*, Ion VETRES, Politehnica University Timișoara, ROMANIA

11⁴⁰ – 12⁰⁰ *Interactive Virtual World*, Petrică BOTA, Robert SĂNDICĂ, Dana SIMIAN, „Lucian Blaga” University of Sibiu, ROMANIA

12⁰⁰ – 12²⁰ *Do the statistical properties of a time series influence the performances of some artificial intelligence models?*, Alina BĂRBULESCU, Higher Colleges of Technology, Sharjah, UAE

Session 4 *Chairman Lecturer PhD. Florin Stoica*

15⁰⁰ – 15²⁰ *Data structuring for the ontological modelling of wind energy systems*, Adrian GROZA, Technical University of Cluj-Napoca, ROMANIA

15²⁰ – 15⁴⁰ *Imperialist Competitive Algorithm with Variable Parameters to Determine the Global Minimum of Functions with Several Arguments*, Stelian CIUREA, „Lucian Blaga” University of Sibiu, ROMANIA

15⁴⁰ – 16⁰⁰ *Top - Down clustering used in analysis of the Romanian Teachers' Training Needs on Information and Communications Technology*, Daniel HUNYADI, Daniel MARA, „Lucian Blaga” University of Sibiu, ROMANIA

16⁰⁰ – 16²⁰ *Using the Fourier Transform and the Power Spectral Density functions for Pattern Recognition in Dynamic Light Scattering Time Series*, Dan CHICEA, Silviu REI, „Lucian Blaga” University of Sibiu, ROMANIA

16²⁰ – 16⁴⁰ *Evaluation of the computational complexity of some hash functions*, Olga KOROL, Simon Kuznets Kharkiv National University of Economics, UKRAINE, Mykhailo DOROKHOV, University of Tartu, ESTONIA

A B S T R A C T S

Plenary Lecture

Discovering semantic links in texts. Corpora and projects

Dan Cristea

*„Alexandru Ioan Cuza” University of Iași
Faculty of Computer Science
Iași, ROMANIA*

Free texts are extremely rich in semantic relations, which we, human beings, are at ease to decipher while reading. If this would not be the case, important messages contained there would be obscure and texts would be incomprehensible. In order to make the machine reach a human-like level of performance, properly annotated corpora should be built. In the first part of my talk I will present an experiment developed with our students in Computational Linguistics to acquire a corpus of entities and semantic relations, the QuoVadis project. In the second part of the talk, I will bring forward another human capacity, which we would like to reproduce on machine, the ability to make connections between mentions of notorious entities in books and their virtual realizations. The MappingBooks project, which I will shortly describe, realizes a technology that transforms the classical book onto a multi-dimensional mash-up which combine textual, geographical and web-found data with personal information related to the reader.

Brief Biography of the Speaker: Dan Cristea is a professor at the „Alexandru Ioan Cuza” University of Iași (UAIC), Faculty of Computer Science (FII), the director of the Research Department in FII. He also holds a part-time position in the Institute of Computer Science of the Romanian Academy, the Iasi branch, and is a correspondent

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member of the Romanian Academy. Back in the '80s he has initiated a line of research in Computational Linguistics and Natural Language Processing in UAIC, which has grown during the years both numerically and qualitatively, up to the actual NLP-Group@UAIC-FII. He is the initiator of the series of EUROLAN Summer Schools in Natural Language Processing (started in 1993, with its 12th edition, in July 2015, hosted by the University "Lucian Blaga" of Sibiu) and a co-director of the series of conferences dedicated to resources and tools for processing the Romanian language (the ConsILR conferences, with its 11th edition – in November this year, in Iasi). He is known for his work on discourse related topics (such as veins theory and anaphora resolution), hierarchical description of linguistic metadata, multilingual linguistic workflows, computational lexicography, and has contributions in the creation of electronic resources for Romanian language (among which, the Romanian WordNet, the electronic version of the Thesaurus Dictionary of the Romanian Language, and the Computational Representative Corpus of Contemporary Romanian Language).

Plenary Lecture
RFID Network Optimization Using Swarm Intelligence
Algorithms

Milan Tuba

*John Naisbitt University
Faculty of Computer Science
Belgrade, SERBIA*

Radio frequency identification (RFID) technology has been recently widely adopted in many fields such as logistics, production, supply chain management, asset tracking etc. RFID systems consist of tags and readers which communicate with each other by radio waves through antennas. Tags are cheap and passive, attached to the items that are subject of tracking, while readers are more expensive and powered. Tags respond by backscattering portion of the received reader's signal. Sufficient number of readers should be deployed with the goal of establishing a coverage of the tags in the respective domain. Multiobjective RFID network planning problem (MORNP) is a hard optimization problem which deals with a set of objectives (tag coverage, load balance, economic efficiency, readers' interferences, etc.) by adjusting the control variables (readers' coordinates, the number of readers, antenna parameters, etc.) of the system. Population based stochastic metaheuristics have been successfully used to tackle this problem. Swarm intelligence is one branch of such nature inspired metaheuristics that has been applied to the MORNP optimization. In most implementations a weighted coefficients approach was used to transform MORNP optimization into a single-objective case. However, hierarchical approach can be more promising since objective functions are usually ordered in such a way that, for example, it does not make sense to reduce power if the coverage would be

jeopardized. Additionally, the number of deployed readers as an optimization parameter has to be treated separately. Stochastic optimization algorithms in the process of exploitation (intensification) mutate optimization parameters with the goal of staying close to the good known solutions. However, changing the number of readers (which is an integer parameter) destroys previous search information, effectively introducing exploration (diversification). This lecture will show few successful swarm intelligence applications to the multiobjective RFID network planning problem.

- Milan Tuba, Nebojsa Bacanin, Marko Beko: Multiobjective RFID Network Planning by Artificial Bee Colony Algorithm with Genetic Operators, *Advances in Swarm and Computational Intelligence, Lecture Notes in Computer Science Volume 9140*, 2015, ISBN: 978-3-319-20465-9, Beijing, China, June 2015, pp 247-254, DOI: 10.1007/978-3-319-20466-6_27
- Milan Tuba, Nebojsa Bacanin, Raka Jovanovic: Hierarchical Multiobjective RFID Network Planning Using Firefly Algorithm, ISBN 978-1-4799-8966-9/15, *International Conference on Information and Communication Technology Research (ICTRC2015)*, IEEE and Khalifa University, Abu Dhabi, United Arab Emirates, May 2015, pp. 279-282
- Milan Tuba, Nebojsa Bacanin: Hybridized Bat Algorithm for Multi-objective Radio Frequency Identification (RFID) Network Planning, *IEEE Congress on Evolutionary Computation (CEC2015)*, Sendai, Japan, May 2015, ISBN: 978-1-4799-7491-7, 978-1-4799-7492-4/15, pp. 499-506
- Milan Tuba, Nebojsa Bacanin, Marko Beko: Fireworks Algorithm for RFID Network Planning Problem, *25th International Conference Radioelektronika 2015 (MAREW 2015)*, IEEE and University of Pardubice, ISBN 978-1-4799-8117-5, Pardubice, Czech Republic, April 2015, pp. 440-444
- Nebojsa Bacanin, Milan Tuba and Ivana Strumberger: RFID Network Planning by ABC Algorithm Hybridized with Heuristic for Initial Number and Locations of Readers, *UKSim-AMSS 17th International Conference on Computer Modelling and Simulation*, Cambridge, United Kingdom, March 2015, IEEE Computer Society, ISBN 978-1-4799-8712-2, DOI 10.1109/UKSim.2015.83, pp. 39-44

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- Milan Tuba, Nebojsa Bacanin, Adis Alihodzic: Firefly algorithm for multi-objective RFID network planning problem, Proceedings of the IEEE 22nd Telecommunications Forum TELFOR 2014, ISBN: 978-1-4799-6190-0, IEEE Catalog Number: CFP1498P-CDR, November 2014, pp. 95-98

Brief Biography of the Speaker: Milan Tuba is the Dean of Graduate School of Computer Science and Provost for mathematical, natural and technical sciences at John Naisbitt University. He received B. S. in Mathematics, M. S. in Mathematics, M. S. in Computer Science, M. Ph. in Computer Science, Ph. D. in Computer Science from University of Belgrade and New York University. From 1983 to 1994 he was in the U.S.A. first as a graduate student and teaching and research assistant at Vanderbilt University in Nashville and Courant Institute of Mathematical Sciences, New York University and later as Assistant Professor of Electrical Engineering at Cooper Union School of Engineering, New York. During that time he was the founder and director of Microprocessor Lab and VLSI Lab, leader of scientific projects and theses supervisor. From 1994 he was Assistant Professor of Computer Science and Director of Computer Center at University of Belgrade, from 2001 Associate Professor, Faculty of Mathematics, University of Belgrade, and from 2004 also a Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade. He was teaching more than 20 graduate and undergraduate courses, from VLSI Design and Computer Architecture to Computer Networks, Operating Systems, Image Processing, Calculus and Queuing Theory. His research interest includes mathematical, queuing theory and heuristic optimizations applied to computer networks, image processing and combinatorial problems. Professor Tuba is the author or coauthor of more than 150 scientific papers and coeditor or member of the editorial board or scientific committee of number of scientific journals and conferences. Member of the ACM, IEEE, AMS, SIAM, IFNA.

Contributed Talks

Do the statistical properties of a time series influence the performances of some artificial intelligence models?

Alina Bărbulescu

Studies on forecasting with Generalized Regression Neural Network (GRNN) and Support Vector Regression (SVM) show that this technique can be a promising option to nonlinear time series modeling, in general, and for financial series, in particular. Since systematic studies concerning their performances on modeling different time series were not performed, our aim is to provide such an analysis.

The first step is to test the statistical properties of these series, as randomness, trend existence, stationarity and the change point's existence.

The second one is building models for the series, the subseries detected after the segmentation and the deseasonalized ones.

Finally, comparisons of the modeling results are done, for the initial series, the deseasonalized and the detrended series, for observing the influence of the seasonality or trend removal on the models' quality.

It is proved that "regularity" properties don't influence the models' quality, but the seasonality removal conduct to better models.

Agent-based computational models implemented in 3D space

Florentin Bota, Dan Dumitrescu

The purpose of this project is to design and develop a unique state-of-the-art graphical platform that can be used to simulate and render different computational models in a 3D world. Using this platform we will be able to observe processes like emergent behaviours in a new perspective, using Unity3D as a graphics engine and C# as the main programming language. The finished product will be called VisualAgents and it will provide us with a new tool in our study of Complex Systems and Computational Models. In this paper we will present an agent-based approach of the platform, specifically a multi-agent ant colony. This project intends to create a better simulation tool that will be used in further experiments and for educational purposes.

Interactive virtual world

Petrică Bota, Robert Săndică, Dana Simian

Virtual world is a concept that has gained popularity recently but it has been present for nearly half a decade, first appearing in 1950's. There are many areas that can benefit from the use of this technology, like: tourism, medicine, film, gaming, etc.

This article presents applications of virtual world concept in the gaming industry by creating an environment which the user can explore and interact with. Our system makes use of virtual reality glasses to project realistic surroundings where the player uses a controller designed by us in order to interact with the world.

The proposed system is intended to be a new platform for the users as well as for the developers.

Optimization of Control Systems By PENDULAR Concept

Cătălin Nicolae Calistru

The paper presents an exciting strategy in control, intire developed by the author, PENDULAR control. PENDULAR is the mnemonic of Pendulum Efficiency with Nonlinear Dynamics in Achievement of Robustness. The main idea is to optimize conventional structures using a nonlinear element on the feedback loop. That will transform a conventional control system into a variable structure system (VSS system). Having in view the simplicity of the control algorithm, a complete description of these systems, the study of stability and the Essential PENDULAR system (EPS) is presented in the paper. Simulation examples and experimental results show the efficiency of the PENDULAR concept.

Using the Fourier Transform and the Power Spectral Density functions for Pattern Recognition in Dynamic Light Scattering Time Series

Dan Chicea, Silviu Rei

If a coherent beam is incident on a suspension containing scattering centers, light is scattered and a far interference field is produced, having the aspect of speckled image. As the scattering centers undergo a complex motion, the far field presents fluctuations that carry information regarding the motion. The motion can be: a random Brownian motion, a relatively uniform sedimentation motion or a combination of both motions with different weight. Placing a detector in a far field

and recording the fluctuations will produce a time series. A previously written and tested code named CHODIN was used to generate time series for several systems. The Fourier transform and the Power Spectral Density were used and the results are discussed in connection with the problem of very fast identification of the type of motion, and therefore the type of scattering centers suspended in the target fluid.

Imperialist Competitive Algorithm with Variable Parameters to Determine the Global Minimum of Functions with Several Arguments

Stelian Ciurea

We have implemented an Imperialist Competitive Algorithm (ICA) to determine the global minimum for nine functions. Some of these represent benchmarks of the problem, while others have expressions that we have defined. For a start, we used three of these functions to determine a set of optimal parameters for the ICA. Then we studied the way in which the behaviour of the ICA is affected by these parameters in order to solve the problem put forth for the nine functions. Finally, we studied the behaviour of the ICA as affected by variable parameters for the most difficult of the nine functions. In our algorithm, the values of some of the parameters change dynamically. The results indicate a better behaviour of the solutions provided by this method.

Data structuring for the ontological modelling of wind energy systems

Adrian Groza

Small wind projects encounter difficulties to be efficiently deployed, partly because wrong way data and information are managed. Ontologies can overcome the drawbacks of partially available, noisy, inconsistent, and heterogeneous data sources, by providing a semantic middleware between low level data and more general knowledge. In this paper, we engineer an ontology for the wind energy domain using description logic as technical instrumentation. We aim to integrate corpus of heterogeneous knowledge, both digital and human, in order to help the interested user to speed-up the initialization of a small-scale wind project. We exemplify one use case scenario of our ontology, that consists of automatically checking whether a planned wind project is compliant or not with the active regulations.

Power Monitoring Scheme of a Net Metering Miniature System

**Jeffrel Hermias, Rashid Jull De Luna, Anthony Joseph Lavilla,
Marven Jabian, Noel Estoperez**

Net Metering is an electricity policy wherein renewable power sources at home are integrated into the power utility. One of the reasons these sources must be integrated is to give the excess power to the utility when net generation is produced. However, if this renewable source cannot provide enough power to sustain the exact amount of needed electricity, there is a need to request for more at the utility; thus, the Net Metering policy was established.

This paper aims to validate a Net Metering miniature setup with respect to its power monitoring scheme and seeks to evaluate said power monitoring scheme. We formulated a miniature Net Metering system design to model the actual commercial net meter system and test the validity of the setup by performing three cases for switching action while monitoring power data from the AC analyzer on a real-time basis. There are also three switching action cases for the power monitoring scheme, as well as three different cases for the design's implementation. Real-time power monitoring is executed using Matlab and its `xlswrite` function; upon performing three different load cases, data is gathered to show the power monitoring method. During case shifting, there is a negligible delay of displaying power data in the GUI due to data communication from AC analyzer to the Matlab GUI and is negligible enough to invalidate the setup.

Top - Down clustering used in analysis of the Romanian Teachers' Training Needs on Information and Communications Technology

Daniel Hunyadi, Daniel Mara

This article presents some important aspects regarding the analysis on Romanian Teachers' Training Needs on Information and Communications Technology (ICT), using top-down clustering. The scope of this analysis is to create clusters regarding to the teacher's training needs on ICT. This analysis was made inside a project which generates significant results in the life-long learning of the teachers from all levels of the Romanian education system. The general objective of the project aims to increase the level of the teaching staff information, competences and abilities concerning the Information and Communications Technology. It also aims to improve the e-learning interactive methods and the activity with the disabled in order to use them also within

the didactic activity, to improve the results of the educational process as well as to increase the disabled access to education.

Evaluation of the computational complexity of some hash functions

Olga Korol, Mykhailo Dorokhov

The paper analyzes the computational complexity of the software implementation of cryptographic algorithms used in communication systems. A method of forming a cascade control codes of integrity and authenticity of data based on the algorithm UMAC with the final stage cryptographically strong hash function strictly on the basis of universal modular transformations algorithms MASH-1 and MFSH-2 has been proposed. Improved algorithm allows provide high collisional properties of strictly universal hashing, low computational complexity in the processing of large volumes of data and provide high safety performance at the level of modern means of provable resistance cryptographic protection. The resulting estimates of the specific computational complexity of forming MAC show that with increasing length of the processed information data for a fixed level of security specific computational complexity is reduced. For a high level of resistance (128 bits), the same result occurs for data blocks of 215 bytes. For check the reliability of hashing algorithms be used the test suite NIST STS on a particular method study the statistical properties of hash functions. The analysis of the test results showed that the proposed algorithm can provide high-level security of modern provable resistance cryptographic protection.

A continuous reformulation of the quadratic unconstrained binary optimization problem

Vasile Moraru, Sergiu Zaporojan

In this paper we consider the quadratic unconstrained binary optimization (QUBO) problem. Using a suitable function and penalty parameter we can reformulate the original QUBO problem as a continuous program. The preliminary numerical results with a problems test set are presented.

Contributions on the diagnose of functioning components of a cinematic chain through the analysis of the electric current and temperature at the operating engine

Ionel Păunescu, Paul Liviu Păunescu, Ștefan Velicu

The analysis of the electric current and temperature can constitute a very valuable instrument in any monitoring program of the operating status of components of cinematic chain for an equipment and gives the maintenance department the possibility to choose the moment of an intervention and as a direct result it reduces the costs. The analysis of electric current and temperature is based on the fact that the engine can be viewed as a transmitter.

By installing an electric current sensor we can observe the electric current fluctuations of the engine. It is important to understand the limitations of using this type of analysis, imposed by the load conditions, when the engine is insufficiently loaded, and it is important to take all the logistic measures to obtain correct data which allow to evaluate the evolution of the engine parameters. Taking into

considerations the load at which the engine is functioning when the analysis of the electric current and temperature is made, we can monitor the results that appear in the normal loading regime of the equipment. Having in mind that in this case the engines can be tested remotely, from the control panel, it eliminates right from the beginning the risk of making measurements in dangerous and inaccessible areas and will give the possibility of early recommendations for the maintenance department. It will also pay off the required investment to implement the research (the analysis of electric current and temperature) at an equipment. a workflow model for communication management.

A comparative analysis of social media tools

Antoniu Gabriel Pitic, Elena Alina Pitic, Călin Bucur

Social media represent a collection of internet based applications used to facilitate their users to create or exchange content. Examples of social media are social networks (Facebook), blogs, microblogs (Twitter), media sharing platforms (Youtube), instant messaging (Skype) or even massively multiplayer online games. In this paper we determine some of the most important features of a social media tool and we realize a comparative study between more than 30 tools.

Developing Internet of Thinks - based environment smart sensing network using model view controller

Mircea Risteiu, Ioan Ileana, Constantin Hutanu, Gheorghe Marc

The paper is a part of environment smart sensing, framed into Internet of Thinks. Based on the fact that the sensor network is dynamically changing its configuration, the storing, preprocessing and processing of the data are changeable in time by user, and the viewing and reporting also need to be changed quite often, an independent approach need to be implemented for each three part of the system. Model- View-Controller (MVC) is the technique we are experiencing in our application. In this three layer architecture, after the initialization of the MVC, we are testing real time meaning in sensor network, we updates different processing applications on the server side, for querying optimization, and we are measuring the user interaction with view which calls a specified controller action. We also measure and test how the controller updates the models and how the view is refreshed for two different kind of smart sensors. By combining XML- based technologies with JavaScript Object Notation (json), we have imagined a scenario with multiple file input control with one type list stored in the XML file, instead of creating multiple properties, one for each control. By using one model builder that updates the property with the values by json serialization, there is a way of independent update of the processing functions on the server side.

Modeling of phenomena in linear elasticity using Intrinsic Finite Elements technologies

Corina Simian

We have developed an approach for the derivation of intrinsic conforming and non-conforming finite element spaces for the discretization of elliptic partial differential equations. To introduce our method we used Poisson's equation as a model problem, but we emphasize that this method is applicable also for general elliptic equations and one of the goals of this article is to study how we can apply our method for the elasticity problems. Unlike the usual methods, the intrinsic method supposes the direct computation of fluxes instead of the computation of the potential for problems in potential theory and the direct computation of the linearized strain tensor field instead of finding the displacement vector field in elasticity problems. This has an exceptional benefit in modelling real-life problems in medicine or biology (e.g.: the study of the elasticity of different cells or organs).

Ownership tracking system with dynamic identification of watermark patterns

Dana Simian, Ralf Fabian

The demand of adaptation in marking digital content for later author identification is of huge interest given that nowadays it is becoming easier to acquire multimedia content. The paper focuses on visual content based owner or author identification applicable to digital images. It builds on a thoroughly survey of techniques designed

for minimal image quality loss. The techniques employed are chosen to reduce tempering visual delight of an image and making inserted information hardly detectable or removable. We propose an architecture, for a system intended to provide digital watermarking services with automatic ownership tracking.

The main issue in this endeavor is to overcome pattern degradation if the host image has been altered. To address this problem, two strategies have been elaborated: a) tuning the watermarking process; b) applying a neural network classifier. Whereas, tuning is accomplished over benchmarking with several test images and patterns, the more challenging classifier design implies generating an initial training data set upon known transformations. The amount in that the mark is recovered and identified correctly can be identified in the presented test results.

From a user perspective, the paper outlines, in the end, several opportunities the proposed system might offer for easing accessibility to watermarking procedures, preserving simplicity in usability and ubiquity in appliance.

Generating a CTL model checker using an attribute grammar

Laura Florentina Stoica, Florin Stoica, Florian Mircea Boian

The attribute grammars are presented as a formal approach for model checkers development. Our aim is to design a CTL model checker from a context-free grammar which generates the language of the CTL formulas. An attribute grammar may be informally defined as a context-free grammar that has been extended with set of attributes and a collection of evaluation rules.

We are using a CTL attribute grammar for specifying an operational semantics of the language of the CTL formulas by defining a translation into the language which

describes the set of nodes from the CTL model where the corresponding CTL formulas are satisfied.

We provide a formal definition for an attribute grammar used as input for Another Tool for Language Recognition (ANTLR) to generate an algebraic compiler.

Also, is presented the technique of implementing the semantic actions in ANTLR, which is the concept of connection between attribute evaluation in the grammar that generates the language of CTL formulas and algebraic compiler implementation that represents the CTL model checker.

Adaptive Time Discretization for Retarded Potentials

Alexander Veit

We consider retarded boundary integral formulations of the three-dimensional wave equation in unbounded domains. Our goal is to apply a Galerkin method in space and time in order to solve these problems numerically. In this approach the accurate computation of the system matrix entries is the major bottleneck. In order to simplify the arising quadrature problem, we use globally smooth and compactly supported basis functions for the time discretization. This furthermore easily allows the use of a variable time-stepping and a variable order of the approximation in time. In order to obtain a scheme that automatically adapts the time grid to local irregularities in the solution we use suitable a posteriori error estimators. Various numerical experiments show the behavior of the adaptive algorithm.

New model for vertical wind speed estimation based on Lidar, sky photometry and real data

Ion Vetres

For an efficient power plant location, information regarding the wind speed it is a must. The paper give a new model for wind speed estimations by combining information from an elastic Lidar system (simple construction on a single wavelength – 532 nm) and video tracking of clouds movement obtained from a webcam. Measurement data can be compared with the simulated data and also by the data obtained from other methods, in this case from this complementary techniques.

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