

Lucian Blaga University of Sibiu, Romania
Faculty of Sciences
Research Center in Informatics and Information Technology

MDIS 2019

6th International Conference on
Modelling and Development of Intelligent Systems

Volume of Abstracts and Program

October 3-5, 2019

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PREFACE

The aim of the conference is to bring together computer scientists, mathematicians, researchers and students interested in the topics of the conference. The conference welcomes submissions of original papers on all aspects of modelling and development of intelligent systems ranging from concepts and theoretical developments to advanced technologies and innovative applications.

The conference includes Plenary Lectures (30 min), Regular Lectures (20 min) and a Round Table with scientific discussions.

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

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- 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

Specialists from Algeria, Bosnia and Herzegovina, Bulgaria, Croatia, Germany, Morocco, Portugal, Pakistan, Qatar, Romania, Russia, Serbia, Switzerland and Ukraine join together to this sixth edition of the conference to present and discuss recent problems on mathematical models, design, development and applications of intelligent systems.

All submitted papers underwent a double blind peer review. Each paper was reviewed by at least 3 independent experts in the field. Paper acceptance for presentation and/or publication was judged based on their relevance to the conference topics, clarity of presentation, originality and accuracy of results and proposed solutions.

A post-conference proceedings will be published by Springer Verlag in the series Communications in Computer and Information Science (CCIS).



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Prof. Dr. Dana Simian

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- Laura Stoica
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OFFICIAL LANGUAGE

The official language of the conference is English.

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ROPARDO



Top Tech



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P R O G R A M

THURSDAY, October 3, 2019

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

9⁰⁰ – 9⁵⁰	Registration
10⁰⁰ – 10¹⁵	Opening ceremony
10¹⁵ - 10⁴⁵	Keynote Speaker Lyubomyr Demkiv , Lviv Polytechnic National University and Robotics Lead at SoftServe Inc. Lviv, Ukraine <i>Intelligent real-time control of ground robots</i>
10⁴⁵ – 11⁰⁵	IT company presentation (NTT) Marco Olescu <i>Educate vs. Corporate: what, if and but</i>
11⁰⁵ – 12⁰⁵	Papers presentation – Chair Lyubomyr Demkiv
11 ⁰⁵ – 11 ²⁵	Kiril Alexiev <i>Nonlinearity Estimation of Digital Signals</i>
11 ²⁵ – 11 ⁴⁵	Florentin Bota, Dana Simian <i>Computational Models using Evolutionary Game Theory</i>
11 ⁴⁵ – 12 ⁰⁵	Diana Borza, Razvan Itu, Radu Danescu, Ioana Barbantan <i>Analysing facial features using CNNs and computer vision</i>
12⁰⁵ – 12³⁰	Coffee break
12³⁰ – 13⁵⁰	Papers presentation – Chair George Eleftherakis
12 ³³ – 12 ⁵⁰	Aleksandr Yurin, Nikita Dorodnykh, Alexey Shigarov <i>Conceptual model engineering for industrial safety inspection based on spreadsheet data analysis</i>
12 ⁵⁰ – 13 ¹⁰	Hua Yang, Teresa Gonçalves <i>Aggregation on Learning to Rank for Consumer Health Information Retrieval</i>
13 ¹⁰ – 13 ³⁰	Detlef Streitferdt, Livia Sangeorzan <i>Agile Product Line Tool Development in C++</i>
13 ³⁰ – 13 ⁵⁰	Alexandra Badea, Cristina Cleopatra Bacauanu, Alina Barbulescu <i>Prediction of Geenhouse Series Evolution. A case study</i>

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13⁵⁰ – 15⁰⁰	Lunch
15⁰⁰ – 17⁰⁰	Papers presentation – Chair Dana Simian
15 ⁰⁰ – 15 ²⁰	Cristiana Constantinescu, Victor Birsoghe <i>Advanced Protection Techniques against Unwittingly Distribution of Sensitive Data in Social Networking</i>
15 ²⁰ – 15 ⁴⁰	Ufuoma Chima Apoki, Humam K.Majeed Al-Chalabi, Gloria Cerasela Crisan <i>From Digital Learning Resources to Adaptive Learning Objects: An Overview,</i>
15 ⁴⁰ – 16 ⁰⁰	Mircea Ristoiu, Florin Samoila, Remus Dobra, Alexandru Avram <i>Implementation of the error management code diagnostic software in distributed electronic circuits using ARM Cortex controller</i>
16 ⁰⁰ – 16 ²⁰	Gheorghe-Catalin Crisan <i>Recommendation system for improving libraries activity</i>
16 ²⁰ – 16 ⁴⁰	Virginia Niculescu, Camelia Serban, Andreea Vescan <i>Towards an Overhead Estimation Model for Multithreaded Java programs</i>
16 ⁴⁰ – 17 ⁰⁰	Salik Arsalan, Farooque Azam, Muhammad Waseem Anwar, Ayesha Kiran <i>A Framework for Automation testing of Complex Systems</i>
18¹⁵	Official Dinner Restaurant Sonne, 47 Ștefan cel Mare str.

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FRIDAY, October 4, 2019

Faculty of Sciences,
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1st Floor, Room A18

$9^{30} - 10^{00}$	<p>Keynote Speaker George Eleftherakis, The University of Sheffield International Faculty, CITY College, Thessaloniki, Greece <i>Using primitive brains to achieve emergent smart solutions</i></p>
$10^{00} - 10^{30}$	<p>Keynote Speaker Milan Tuba, Singidunum University, Belgrade and State University of Novi Pazar, Serbia <i>Swarm Intelligence Applied to Medical Image Analysis</i></p>
$10^{30} - 11^{30}$	<p>Papers presentation – Chair Milan Tuba</p>
$10^{30} - 10^{50}$	<p>Daniela Borissova, Delyan Keremedchiev <i>Intelligent System for Generation and Evaluation of e-Learning Tests using Integer Programming</i></p>
$10^{50} - 11^{10}$	<p>Daniel Santos, Luis Rato, Teresa Gonçalves, Miguel Barao, Sergio Costa, Isabel Malico, Paulo Canhoto <i>Composite SVR based modeling of an Industrial Furnace</i></p>
$10^{10} - 11^{30}$	<p>Soraya Sedkaoui, Dana Simian <i>Developed Framework based on Cognitive Computing to Support Personal DataProtection under the GDPR</i></p>
$11^{30} - 11^{50}$	<p>Coffee break</p>
$11^{50} - 13^{30}$	<p>Papers presentation – Chair Florin Stoica</p>
$11^{50} - 12^{10}$	<p>Eva Tuba, Romana Capor Hrosik, Adis Alihodzic, Raka Jovanovic, Milan Tuba <i>Support Vector Machine Optimized by Fireworks Algorithm for Handwritten Digit Recognition</i></p>
$12^{10} - 12^{30}$	<p>Camelia Serban, Florentin Bota <i>A Conceptual Framework for Software Fault Prediction using Neural Networks</i></p>
$12^{30} - 12^{50}$	<p>Ufuoma Chima Apoki, Soukaina Ennouamani, Humam K.Majeed Al-Chalabi, Gloria Cerasela Crisan <i>A Model of A Weighted Agent System for Personalised E-Learning Curriculum</i></p>

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12 ⁵⁰ – 13 ¹⁰	Victor Birsoghe <i>Reliable Technique for Detection of Sniffers in N+1 Subnets Networking Environments</i>
13 ¹⁰ – 13 ³⁰	Ammar Ur Rehman, Farooque Azam, Muhammad Waseem Anwar, Ayesha Kiran <i>A Meta-model for Black-Box Testing of Software Product Lines</i>
13³⁰ – 14³⁰	Lunch
14³⁰ – 15³⁰	Short Presentations and Discussions Session - Moderator Laura Stoica
14 ³⁰ – 14 ⁴⁰	Dan Chicea, Sorin Olaru <i>Simulating Dynamic Light Scattering Time Series Using CHODIN</i>
14 ⁴⁰ – 14 ⁵⁰	Ira Tuba <i>Enhanced firefly algorithm for constrained optimization problems</i>
14 ⁵⁰ – 15 ⁰⁰	Eva Tuba, Ivana Strumberger <i>Bat Algorithm for Brain MRI Segmentation</i>
15 ⁰⁰ – 15 ¹⁰	Corina Simian <i>A model of inflammation in psoriasis</i>
15 ¹⁰ – 15 ²⁰	Ioan Marcu, Anca Vasilescu <i>System for detection and prevention of disease over time</i>
15 ²⁰ – 15 ³⁰	Andreea Vantu, Anca Vasilescu <i>Using technology to improve the medical triage process</i>
18⁰⁰	Conference Dinner Restaurant Gallant, 55 Bd. Victoriei

SATURDAY, October 5, 2019

10⁰⁰ - 14⁰⁰	Excursion to the ASTRA Open Air Museum
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A B S T R A C T S

Plenary Lecture

Intelligent real-time control of ground robots

Lyubomyr Demkiv

Lviv Polytechnic National University

Robotics Lead at SoftServe Inc., Lviv, Ukraine



Abstract: The motion strategy for a ground robot significantly depends on the type of the terrain. Response time for tire-terrain interaction is crucial factor for the mobility of the robot. However, agile control of the robot requires not only the fast-responding controller, but also a state observer that is capable to provide necessary information about sensor data to the controller. Application of hybrid control strategies are beneficial for the mobility of the robot and will be discussed during the presentation.

Brief Biography of the Speaker: Lyubomyr Demkiv received his PhD in 2006 in Numerical mathematics and ScD in 2019 in Control Engineering. Since 2006 he is Associate Professor in Lviv Polytechnic National University. Since 2018 he is with SoftServe Inc. where he presently is Robotics Lead. His research field is intelligent control of dynamical systems.

Plenary Lecture

Using primitive brains to achieve emergent smart solutions

George Eleftherakis

*The University of Sheffield International Faculty, CITY College
Thessaloniki, Greece*



Abstract: Either for or against the validity of Kurzweil's law, it is a fact that technology accelerates at an astonishing pace achieving breathtaking results in any kind of human activity. The Internet of Things, the Cloud, Fog and Edge computing, the daily increasing visions for smarter systems following the advancements in machine learning, and many more technological innovations lead to more demanding requirements than in previous decades for emergent applications of extreme complexity. A promising solution to deal with such complexity is to employ systems that exhibit self* properties, composed by simple agents that communicate and interact following simple protocols achieving desirable emergent properties that allow smart solutions in dynamic environments of extreme complexity.

Nature through millions of years of evolution has many systems like that to exhibit. Studying systems of agents with primitive brains that

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demonstrate remarkable self* properties that emerge and are not explicitly engineered could prove of great value regardless of the required effort. Imitating similar behaviors in artificial systems could offer smart solutions to problems exhibiting high-level complexity that seemed unsolvable, or are solved under very restricting and concrete conditions.

This presentation will present and discuss experiences studying ants, large-bodied animals, bees, hornets, focusing on the latest study of frogs and how their mating strategies could potentially lead to smart solutions in acoustic scene analysis field, disaster management, and many other complex dynamic systems.

Brief Biography of the Speaker: George Eleftherakis is an Associate Professor and the Director of the PhD program at the University of Sheffield International Faculty, CITY College, in Thessaloniki, Greece. He has authored more than 95 publications on the interface of computer science, biology and engineering. His honors include receiving the Senate Award for Sustained Excellence in Learning and Teaching from the University of Sheffield.

Eleftherakis is a Senior ACM member and has been a member of the administration board of the Greek Computer Society since 2002. Since 2013 he has been the Chair of ACM's Committee of European Chapter Leaders and a member of the advisory Committee of ACM-W Europe Council, participating actively in all womENcourage conferences in Europe. He is also the Faculty Advisor for the City College ACM-W Student Chapter at the University of Sheffield International Faculty.

His research is in the wider area of software engineering, and, more specifically, nature-inspired computing. His PhD in Formal Methods and Bachelor in Physics made him realize that computing has reached an extreme level of continuously increasing complexity following an extreme rate of technological advancement, and led him to investigate natural systems exhibiting emergence (the study of how collective properties arise from the properties of parts). This work tried to establish a well-defined, disciplined, scientific way to perform research on natural systems. It established a framework to study diverse biological systems, such as the herding behaviour of large animals, as well as the characteristics of ants, bees, frogs and other systems found in nature. All of these systems exhibited emergence and achieved some remarkable properties, such as self-adaptation, self-organization, etc., that would be desirable in artificial systems. His research investigates ways of modelling artificial solutions mimicking those behaviours inherent in natural systems to achieve artificial systems that were self-adaptive and self-organizing. An architecture for IoT solutions in dynamic environments, based on the initial abstract bio-inspired overlay network proposal called EDBO, and its implementation as middleware, was a concrete outcome of this work. Currently, he is applying these findings to health monitoring, with a focus on chronic diseases, and on acoustic scene analysis.

Plenary Lecture

Swarm Intelligence Applied to Medical Image Analysis

Milan Tuba

Vice-Rector for International Relations

Singidunum University

Belgrade, Serbia

Head of the Department for Mathematical Sciences

State University of Novi Pazar

Novi Pazar, Serbia



Abstract: Digital images introduced big changes in the world. It is significantly easier to make and process digital images than analog ones. Besides using digital images in everyday life, they are an irreplaceable part of numerous scientific areas such as medicine. Images have been used in medicine for over a century but transition from analog to digital images has brought a true revolution in the diagnostic process. Before digital images, medical image analysis depended on physicians' knowledge, experience but also on current psychophysical state of the experts, their visual acuity, concentration, etc. Digital images drastically simplified the

process of medical image analysis since various digital image processing algorithms can significantly speed up and automatize analysis and diagnostics and moreover, computer-aided systems enable objective detection of small changes in digital images of body parts and tissues, even the ones that are not visible to the naked human eye. Applications of medical image processing include tasks such as image enhancement, segmentation, registration, anomaly detection, etc. These applications commonly contain hard optimization problems that need to be solved. Swarm intelligence algorithms, a class of nature-inspired algorithms, have been proved to be very efficient for tackling this class of problems. In the past decades, many different swarm intelligence algorithms have been proposed and applied to various real-world problems, especially to applications of computer-aided diagnostic systems and medical digital image analysis. Examples of successful applications of swarm intelligence algorithms to the medical image processing and analysis problems will be presented in this talk.

Brief Biography of the Speaker:

Milan Tuba is the Vice-Rector for International Relations at Singidunum University, Belgrade and Head of the Department for Mathematical Sciences at State University of Novi Pazar. 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

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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, from 2004 also a Professor of Computer Science and Dean of the College of Computer Science, Megatrend University Belgrade and from 2014 Dean of the Graduate School of Computer Science at John Naisbitt University. 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 heuristic optimizations applied to computer networks, image processing and combinatorial problems. Prof. 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.

IT Company Presentation

Educate vs. Corporate: what, if and but

Marco Olescu

NTT Data

In an era where there seems to be a clear separation between the private and the academic sectors, we can observe more and more companies that have conducted research projects. This presentation compares the academic and corporate worlds on different topics: workflow, assignments, deadlines and cultural barriers etc.

Regular Lectures

Nonlinearity Estimation of Digital Signals

Kiril Alexiev

Assessing the nonlinearity of one signal, system, or dependence of one signal on another is of great importance in the design process. The article proposes an algorithm for simplified nonlinearity estimation of digital signals. The solution provides detailed information to constructors about existing nonlinearities, which in many cases is sufficient to make the correct choice of processing algorithms. The programming code of the algorithm is presented and its implementation is demonstrated on a set of

basic functions. Several steps to further development of the proposed approach are outlined.

From Digital Learning Resources to Adaptive Learning Objects: An Overview

Ufuoma Chima Apoki, Humam K.Majeed Al-Chalabi, Gloria Cerasela Crişan

To successfully achieve the goal of providing global access to quality education, the Information and Communications Technology (ICT) sector has provided tremendous advances in virtual/online learning. One of such advances is the availability of digital learning resources. However, to successfully accommodate learner peculiarities and predispositions, traditional learning is gradually transforming from a one-size-fits-all paradigm towards personalised learning. This transformation requires that learning resources are treated not as static content, but dynamic entities, which are reusable, portable across different platforms, and ultimately adaptive to user needs. This article takes a review of how digital learning resources are modelled in adaptive hypermedia systems to achieve adaptive learning. We analyse existing models of systems based on adaptive learning content and highlight prospects of future work.

A Model of A Weighted Agent System for Personalised E-Learning Curriculum

*Ufuoma Chima Apoki, Soukaina Ennouamani, Humam K.Majeed Al-Chalabi,
Gloria Cerasela Crişan*

Progressive developments in the world of Information and Communications Technology open up many frontiers in the educational sector. One of such is adaptive e-learning systems, which is currently attracting a lot of research and development. Several conceptualizations and implementations rely on single parameters or at most three or four parameters. This is not sufficient to account for the wide range of factors which can affect the learning process in an unconventional learning environment such as the web. Being able to right choose relevant parameters for personalisation in different learning scenarios is vital to accommodate the wide range of these factors. In this paper, we'll do a review of the basic concepts and components of an adaptive e-learning system. Afterwards, we'll present a model of an adaptive e-learning system which generates a specialised curriculum for a learner based on a multi-parameter approach, thereby creating a more personalised and learner-oriented experience for such user. This will involve assembling (and/or suggesting) learning resources (such as text, videos, sound, and external web links) encompassed in a general curriculum and adapting it to specific personalities and preferences of users. The degree of adaptation (of the curriculum) is dependent on a weighted algorithm of the user's

characteristics (that are relevant in each learning scenario) matching the corresponding features of the learning objects.

A Framework for Automation testing of Complex Systems

Salik Arsalan, Farooque Azam, Muhammad Waseem Anwar, Ayesha Kiran

With extensive testing of software systems, an automation testing framework is required to reduce the testing time, effort and maintenance issues. Currently, automation of testing is done without following any proper model/structure thus making it difficult to maintain scripts. In the past, researches have done work on automation testing by focusing on test scripts creation and execution. But, no adequate importance is given to the maintenance of test data and prioritization of test scripts on run time, for smoke and regression testing respectively. Therefore, in this paper a framework is proposed for automation testing which focuses on providing solution for better test data maintenance, test scripts prioritization, test scripts order changing for execution and validation of the test results of tests scripts. This framework is beneficial for complex systems that require a lot test data for testing and cause changes in priority and execution order of the test scripts, due to change in requirements. This framework devises a structure for test engineers for providing reusability, efficient execution, good resource management and better results in automation testing.

Prediction of Geenhouse Series Evolution. A Case Study

Alexandra Badea, Cristina Cleopatra Băcăuanu, Alina Bărbulescu

One of the major global concern areas right now is definitely the pollution. The effects are more and more visible as time passes, our daily activities affecting the environment more than they should. Pollution has effects on air, water and soil. In this project, we intend to analyse data regarding atmospheric pollution. According to the European Economic Area (EEA), air pollution is the main cause of premature death in 41 European nations. Their studies found high levels of air pollutants in Poland that came second on the list, topped by Turkey. Therefore, we aim to determine a model for greenhouse gas (GHG) emissions and atmospheric pollutants in Poland based on a set of data retrieved from a European statistics website.

Reliable Technique for Detection of Sniffers in N+1 Subnets Networking Environments

Victor Birsoghe

Basing on previously done research applied on the field of security compromising scenarios in a computer network, we aim, within the present to state a new feasible and reliable technique of malicious packet analyzer machine detection - one to match any network topology. We will use, upon the following chapters, mathematical models and an algorithm enunciation

in order to sustain our proposed solution. The proposed technique is applicable, despite of previously treated scenarios, not on a single subnet network, but on a network environment composed of $N+1$ subnets.

Intelligent System for Generation and Evaluation of e-Learning Tests using Integer Programming

Daniela Borissova, Delyan Keremedchiev

The major challenge in e-learning is the assessment as a tool to measure students knowledge. In this regard an intelligent system for generation and evaluation of e-learning tests using integer programming is proposed. The described system aims to determine number of questions with different degree of difficulty from a predefined set of questions that will compose the test. It allows also generating tests with different level of complexity. To realize the selection of the questions for different levels of tests two optimization models are proposed. Both of these models are of linear integer programming. The first of them determines the minimum number of questions by selection of more difficult ones, while the second one seeks to maximize the number of questions by selecting of less difficult questions. The numerical application of the described intelligent system for generation and evaluation of e-learning tests demonstrate its usefulness.

Analysing facial features using CNNs and computer vision

Diana Borza, Razvan Itu, Radu Danescu, Ioana Barbantan

This paper presents an automatic facial analysis system which is able to perform gender detection, hair segmentation and geometry detection, color attributes extraction (hair, skin, eyebrows, eyes and lips), accessories (eyeglasses) analysis from facial images. For the more complex tasks (gender detection, hair segmentation, eyeglasses detection) we used state of the art convolutional neural networks, and for the other tasks we used classical image processing algorithms based on geometry and appearance models. When data was available, the proposed system was evaluated on public datasets. An acceptance study was also performed to assess the performance on the system in real life scenarios.

Computational Models using Evolutionary Game Theory

Florentin Bota, Dana Simian

Designing accurate computational models to simulate and predict in complex systems is one of the most difficult tasks in computer science. We propose a new algorithm for creating autonomous agents which can play the economics experiment called "Ultimatum Game". This project is an important step in our study of creating a Unified Model which can be used to analyze human behavior. In this paper we will present our state-of-the-art ultimatum game experiments and the proposed model with

implementation and validation. We used stochastic selection and evolutionary algorithms based on game theory applications in a dynamic environment, where the conditions change over time.

Simulating Dynamic Light Scattering Time Series Using CHODIN

Dan Chicea, Sorin Olaru

In a Dynamic Light Scattering experiment the digital time series can be processed by non-linear fitting the theoretically expected Lorentzian line to the frequency spectrum. The CHODIN code that simulates the Brownian motion and the dynamics of coherent light scattering on suspensions was used to produce Dynamic Light Scattering time series for monodispersed particles. An alternative of linear fit time series processing is presented together with the results. The results indicate that the linear fitting procedure is much faster, yet less precise.

Advanced Protection Techniques against Unwittingly Distribution of Sensitive Data in Social Networking

Cristiana Constantinescu, Victor Birsoaghe

Having as a starting point the most recent security breaches of online social platforms that have revealed severe acts of unauthorized personal information storing, exchanging and selling over internet, we propose to your attention, in a series of articles, several trusted techniques to secure

personal information when exposed to online media. The present debates one of the most important factors that lead to sensitive information leaking and treats the measures that have the greatest impact in securing data distribution over internet in the analyzed threat. We support the statements of this paper with mathematical models applied to algorithms involved in social networking data manipulation and have developed an application to serve as a convenient tool to fulfill the presented techniques.

Recommendation system for improving libraries activity

Gheorghe-Catalin Crisan

The use of graphs in database systems provides a convenient way to help library users with books recommendation. Through the alternatives offered by this solution, library users can find reading books much easier to match their profile. The goal of this article is to solve one of the most important problem in the area of book readers – recommending books that best suits for each reader. We are using some advanced algorithms to find the most relevant books taking into consideration multiple aspects related to the readers. Based on that we will compare the results by applying algorithms like Jaccard Index, Euclidean Distance, Cosine Distance, and Pearson Correlation. Finally, we concluded by specifying the best algorithm to use depending on the user needs.

System for detection and prevention of disease over time

Ioan Marcu, Anca Vasilescu

At present, when the technology tends to govern our lives, people prone to seizures are stepping forward the classic medical treatment to the electrodes surgically implanted in their brains. This will develop a new habit that will take the data from sensors, but the result in time has to be appropriately considered. An electronic package is ready to be used for accompanying the electrical brain activity monitoring and, consequently, the electrodes should send electrical pulses to the brain as soon as possible after a seizure-like activity is detected. A modern reliable application that takes the data directly from a headset is presented here, as a new forward step in the direction of using the reactive programming paradigm and the wearable EEG technology as a supportive solution for doctors.

Towards an Overhead Estimation Model for Multithreaded Java programs

Virginia Niculescu, Camelia Șerban, Andreea Vescan

The main purpose of using parallel computation is to reduce the execution time, but in order to really obtain this we have to carefully analyse and reduce the overhead time induced by additional operations that parallelism imposes implicitly. This paper proposes a new metric that evaluates the

overhead introduced into parallel multithreaded Java programs that follows SPMD (Single Program Multiple Data) model. The metric is a combination of some atomic metrics considering various synchronization mechanisms. A theoretical validation of the proposed metric is presented, together with an empirical one based on experiments for several use cases. Also a complex strategy to refine the metric by obtaining accurate approximation for its weights that are used in combining the considered atomic metrics is presented.

A Meta-model for Black-Box Testing of Software Product Lines

*Ammar Ur Rehman , Farooque Azam , Muhammad Waseem Anwar,
Ayesha Kiran*

Black box testing of Software Product Lines (SPL) is one of the big challenges in IT, software development and testing as well. Many tools and techniques have been proposed by researchers but Quality Assurance (QA) of SPLs still requires to deal with the well-known combinatorial explosion problem. Because the number of products to consider for validation grows exponentially as the number of features increases. In this paper, a meta-model is proposed to overcome this problem by combining two techniques i.e. PLUTO (Product Line Using Test Case Optimization) and regression testing. The validation of behavior and functionality of proposed approach is also done through a case study.

Implementation of the error management code diagnostic software in distributed electronic circuits using ARM Cortex controller

Mircea Ristoiu, Florin Samoila, Remus Dobra, Alexandru Avram

This paper is focused for optimizing error codes testing management in one side, and acting as service Integrator on the other side. Practically, this interdisciplinary research is dedicated to predictive maintenance and automated service scheduling with minimum user's intervention, The proposed implemen-tation uses Arm Cortex controller, with specific operating system that manages Python modules and modern web resources for creating data compatibility and automatic updated for integration in Industry 4.0 and Big Data concepts. The designed sockets together with TCP/IP based wireless communication allow flexibility of our implementation. Data packets carried by TCP/IP protocol are safe, reliable, with no delays in test codes diagnose and interpretation. Some communication comparison tests have been performed for ensuring safe and reliable implementation. This part of research prepares the basement for implementing scanning test direct from CAN bus, for improving high amount of data management.

Composite SVR based modelling of an Industrial Furnace

*Daniel Santos, Luís Rato, Teresa Gonçalves, Miguel Barão , Sérgio
Costa, Isabel Malico, Paulo Canhoto*

Industrial furnaces consume a large amount of energy and their operating points have a major influence on the quality of the final product. Designing a tool that analyzes the combustion process, fluid mechanics and heat transfer and assists the work done during energy audits is then of the most importance.

This work proposes a hybrid model for such a tool, having as its base two white-box models, namely a detailed Computational Fluid Dynamics (CFD) model and a simplified Reduced-Order model (RO), and a black-box model developed using Machine Learning (ML) techniques.

The preliminary results presented in the paper show that this composite model is able to improve the accuracy of the RO model without having the high computational load of the CFD model.

Developed Framework based on Cognitive Computing to Support Personal Data Protection under the GDPR

Soraya Sedkaoui, Dana Simian

The General Data Protection Regulation (GDPR) has entered into force in the European Union (EU) since 25 May 2018 in order to satisfy present difficulties Related to private information protection. This regulation

involves significant structural for companies, but also stricter requirements for personal data collection, management, and protection. In this context, companies need to create smart solutions to allow them to comply with the GDPR and build a feeling of confidence in order to map all their personal data. In these conditions, cognitive computing should be able to assist companies extract, protect and anonymize sensitive structured and unstructured data. Therefore, this article proposes a framework that can serve as an approach or guidance for companies that use cognitive computing methods to meet GDPR requirements. The goal of this work is to examine the smart system as a data processing and data protection solution to contribute to GDPR compliance.

A model of inflammation in psoriasis

Corina Simian

Recently, the urge of finding new treatments and to understand the mechanisms of various diseases lead to an increase in the development of mathematical models with applications in Biology and Medicine. In particular, many mathematical models describing the process of inflammation (e.g.: using different contributor factors as pro-inflammatory mediators and different types of cells) can be found in literature. However, to the best of our knowledge, a mathematical model that describes inflammation for a specific disease was not yet designed. Therefore, in the following, we will describe a model of inflammation in the case of

pustular psoriasis. Psoriasis is an inflammatory skin disease, that is based on genetic and immunologic risk factors. The inflammation results from an increased interaction of different types of cells, immune and non-immune cells, through mediators. In pustular psoriasis it is known that the main player in the pathogenesis is a specific type of cell, the neutrophil. Even if, in general, neutrophils have an important role in clearing the infection, in many cases they induce unnecessary inflammation and tissue damage. In our model we are interested to characterize the inflammatory process using proinflammatory stimuli and two types of cells that have the most significant impact on the inflammation and on the healing process. For this, we have chosen neutrophils and macrophages. Two different types of cellular death were considered: apoptosis and necrosis, since the last one contributes also to the inflammatory process. Additionally, another term was examined, the pro-inflammatory mediators, which trigger the activation of neutrophils. Using our model and based on experimental data we have obtained several outcomes from a healthy state to recurring inflammation.

Agile Product Line Tool Development in C++

Detlef Streitferdt, Livia Sangeorzan

The product line domain and agile software development created a good product line concept with complex toolchains and the agile development idea that fosters a rather pragmatic development style. Both parts have

been integrated into two student projects targeting the development of two product line tools. Both solutions have been pragmatic in the development approach, but are still of high quality. In this article, both projects are presented and analyzed. Finally, we can state that the product line domain enables the development of in-house tools which are of advantage for small scale product lines and in addition, have a positive effect on the team cohesion.

A Conceptual Framework for Software Fault Prediction using Neural Networks

Camelia Șerban, Florentin Bota

Software testing is a very expensive and critical activity in the software systems' life-cycle. Finding software faults or bugs is also time-consuming, requiring good planning and a lot of resources. Therefore, predicting software faults is an important step in the testing process to significantly increase efficiency of time, effort and cost usage.

In this study we investigate the problem of Software Faults Prediction (SFP) based on Neural Network. The main contribution is to empirically establish the combination of Chidamber and Kemer's software metrics that offer the best accuracy for faults prediction with numeric estimations by using feature selection. We also proposed a conceptual framework that integrates the model for fault prediction.

Support Vector Machine Optimized by Fireworks Algorithm for Handwritten Digit Recognition

*Eva Tuba, Romana Capor Hrosik, Adis Alihodzic, Raka Jovanovic,
Milan Tuba*

Handwritten digit recognition is an important subarea in the object recognition research area. Support vector machines represent a very successful recent binary classifier. Basic support vector machines have to be improved in order to deal with real world problems. Introduction of soft margin for outliers and misclassified samples as well as kernel function for non linearly separably data leads to the hard optimization problem of selecting parameters for these two modifications. Grid search which is often used is rather inefficient. In this paper we propose the use of one of the latest swarm intelligence algorithms, the fireworks algorithm, for the support vector machine parameters tuning. We tested our approach on standard MNIST base of handwritten images and with selected set of simple features we obtained better results compared to other approaches from literature.

Bat Algorithm for Brain MRI Segmentation

Eva Tuba, Ivana Strumberger

Digital image segmentation is one of the first steps in medical image analysis. Segmentation of brain magnetic resonance images is very important since it can be used to identify various brain abnormalities by

differentiation of various brain tissues. One of the methods for image segmentation is multilevel image thresholding which is a hard optimization problem. For such problems swarm intelligence algorithms proved to be successful. In this paper we used Kapur's and Otsu's method for multilevel image thresholding optimized by recent swarm intelligence bat algorithm. Quality of the method was tested on brain magnetic resonance images from public data sets. To validate the proposed method we compared our results with other methods from literature. Our algorithm provided better results.

Enhanced firefly algorithm for constrained optimization problems

Ira Tuba

Firefly optimization algorithm is one of the recent and most promising swarm intelligence metaheuristics for tackling hard solvable optimization problems. It is based on the social and biochemical characteristics of the fireflies. While firefly algorithms proved itself as a robust metaheuristics on various numerical and engineering optimization problems, it was not properly tested on a wide set of constrained benchmark functions. Our main improvement is correlated with the adoption of exploration mechanism from other swarm intelligence algorithm, introduction of new exploitation mechanism, and on the parameter-based tuning of the exploration-exploitation balance. We tested our approach on a standard benchmark set of 13 constrained numerical functions and showed that it

not only overcame weaknesses of the original FA, but also outperforms other state-of-the-art swarm intelligence algorithms.

Using technology to improve the medical triage process

Andreea Vantu, Anca Vasilescu

Nowadays we are using technology to fulfil each and any of our demands and needs. We have smart homes, smartwatches, smart everything. What if we choose to make the aspects of our lives that truly matter, like medical systems, to be smart? This research focuses on the triage process in the emergency hospital room as one of the most important topics of our medical systems. Real experiences and needs collected from some hospitals in our area prompted the starting point of this application. Knowing this real demand, we have developed a software application that could support both patients and medical staff by digitizing the whole process and by making critical information available now and here.

Aggregation on Learning to Rank for Consumer Health Information Retrieval

Hua Yang, Teresa Gonçalves

Common people are increasingly acquiring health information depending on general search engines which are still far from being effective in dealing with complex consumer health queries. One prime and effective

method in addressing this problem is using Learning to Rank (L2R) techniques. In this paper, an investigation on aggregation over field-based L2R models is made. Rather than combining all potential features into one list to train a L2R model, we propose to train a set of L2R models each using features extracted from only one field and then apply aggregation methods to combine the results obtained from each model. Extensive experimental comparisons with the state-of-the-art baselines on the considered data collections confirmed the effectiveness of our proposed approach.

Conceptual model engineering for industrial safety inspection based on spreadsheet data analysis

Aleksandr Yurin, Nikita Dorodnykh, Alexey Shigarov

Conceptual models are the foundation for many modern knowledge-based systems, as well as a theoretical basis for conducting more in-depth scientific research. Various information sources (e.g., databases, spreadsheets data, and text documents, etc.) and the reverse engineering procedure can be used for creation of such models. In this paper, we propose an approach to support the conceptual model engineering based on the analysis and transformation of tabular data from CSV files. Industrial safety inspection (ISI) reports are used as examples for spreadsheets data analysis and transformation. The automated conceptual model engineering involves five steps and employs the following software: TabbyXL for extraction of canonical (relational) tables from arbitrary

spreadsheet data in the CSV format; Personal Knowledge Base Designer (PKBD) for generation of conceptual model fragments based on analysis and transformation of canonical tables, and aggregating these fragments into do-main model. Verification of the approach was carried out on the corpus contain-ing 216 spreadsheets extracted from six ISI reports. The obtained conceptual models can be used in the design of knowledge bases.

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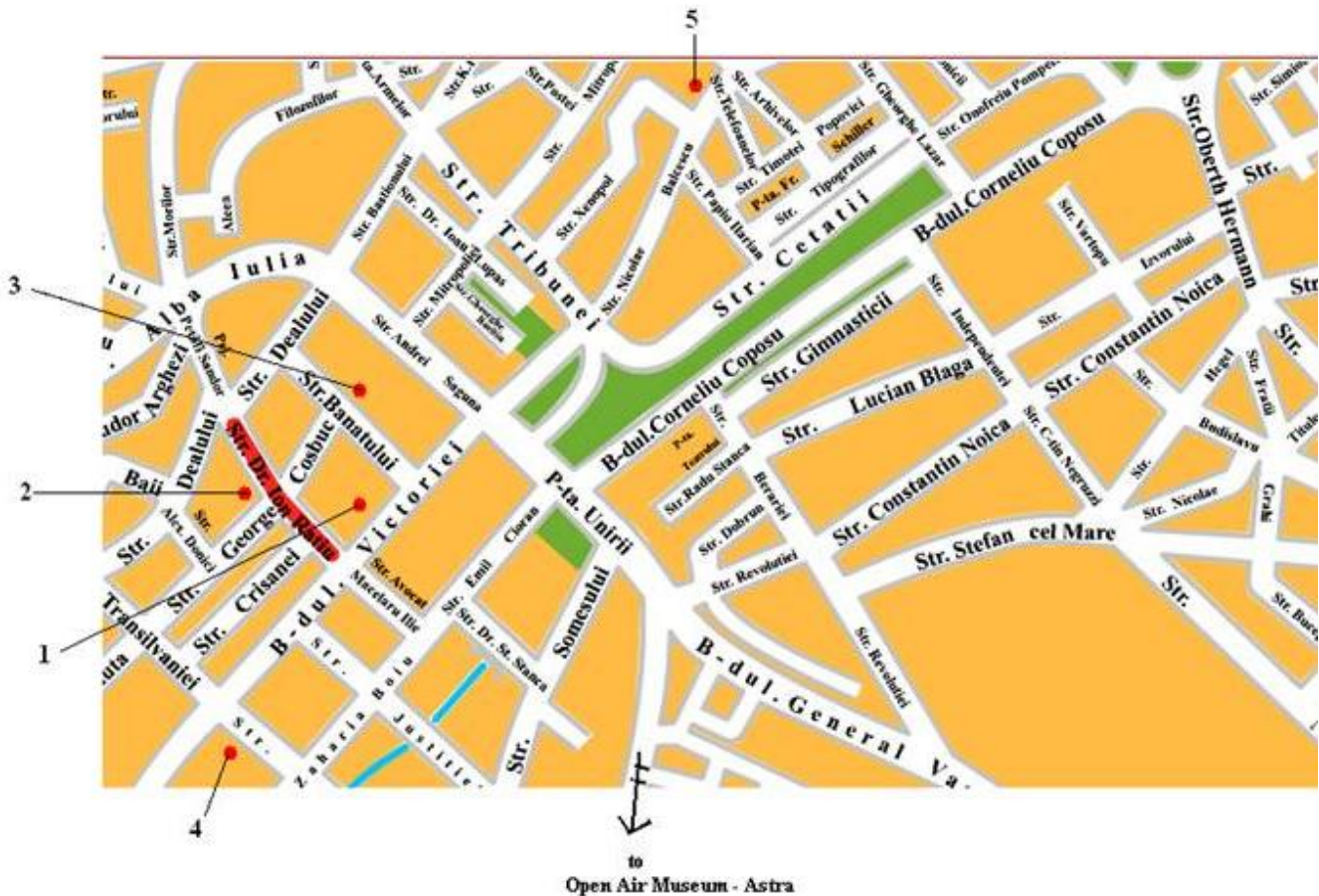
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Map of Sibiu – Conference venue



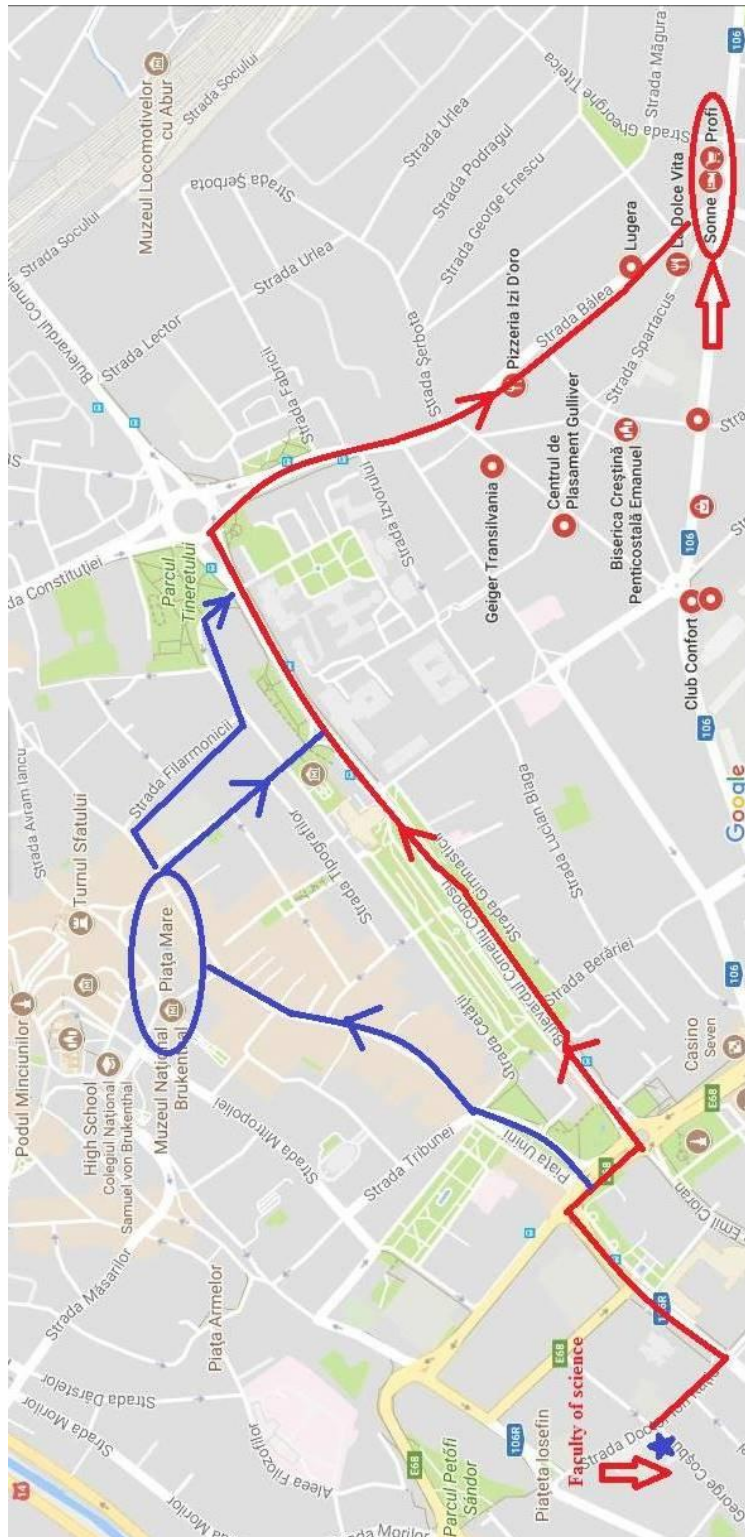
Location

1. Rectorat
2. Faculty of Science
3. Academic Reunion Center
4. University Canteen
5. Pedestrian street, Big square
6. Open Air Museum

Address

- 10 Victoriei Blvd.
- 5-7 Dr. Ratiu Str.
- 6 Banatului Str.
- 31 Victoriei Blvd.
- Nicolae Balcescu Str.
- Sibiu, Calea Rasinari

Official Dinner – Restaurant Sonne

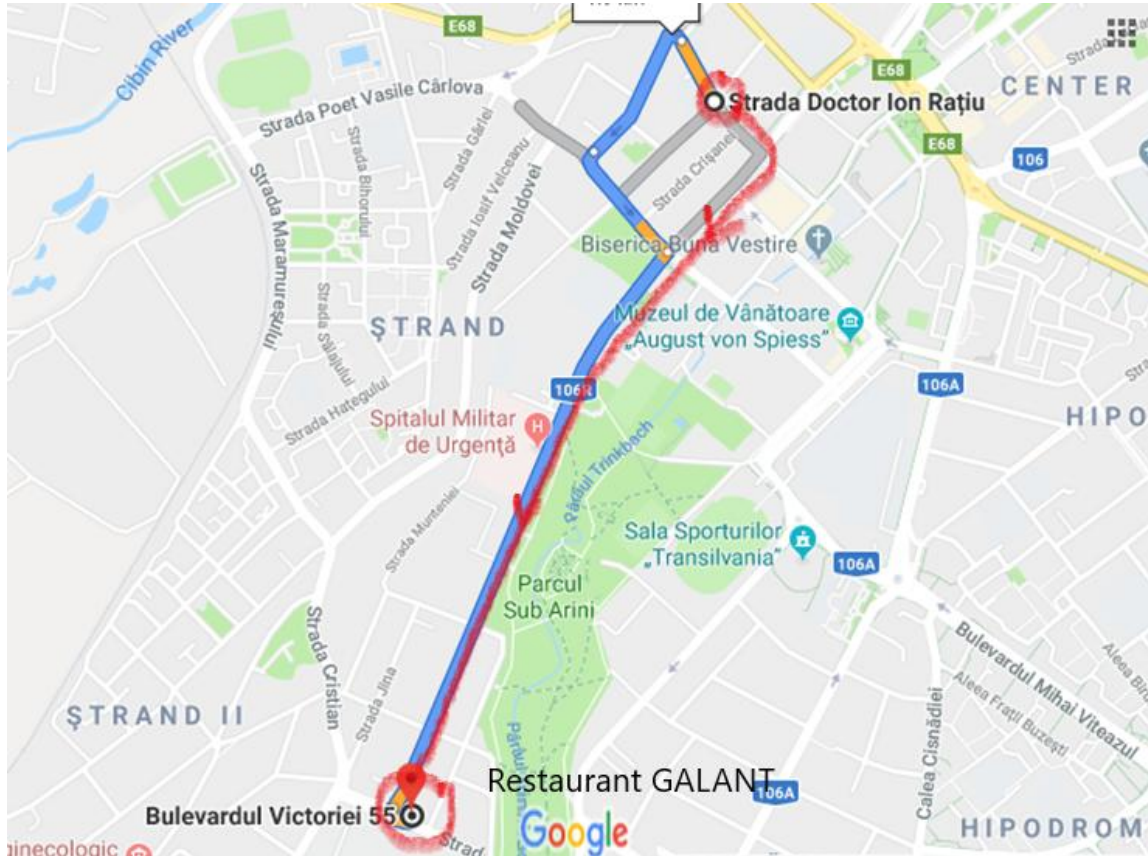


Blue line – only Pedestrian street

Red line – Auto and Pedestrian street

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Conference Dinner – Hotel Gallant



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