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BOOK OF ABSTRACTS

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Table of Contents

An Overview of Local Approach for Time Series Analysis and Prediction.....	8
Comparative Analysis of Algorithms for Classification of Text in the Bulgarian Language in Machine Learning	9
Two-finger Touch on Wearable Device Bezel Method for User Pose Recognition	10
Lagrange Method Implemented in Modeling and Simulation, Fundamentals of Animation, Creating Models and Motion of a Character.....	11
Development of a PLC-Based Hybrid PI Controller	12
Selecting the Optimal IT Infrastructure of a Data Center	13
Environmental Performance of High Risk Potential Enterprises in Devnya Municipality	14
Integrated Environmental Management System in High Risk Potential Enterprises.....	15
Employment of the Smart Contracts in the Practicing of the Franchising Business Model	16
Information – Technological Decisions in the Process Engineering for Company Management	17
Development of Wind Energy Projects in Bulgaria - Challenges and Opportunities.....	18
Innovative Information and Communication Technologies - a Precondition for a Higher Competitiveness of the Organization	19
Smart Sustainable Development and Labor Migration in Europe, Eurasia and Balkan Region.....	20
Application of Wavelet Functions in Signal Approximation.....	21
Compression of Images Using Wavelet Functions	22
The Use of the Intensity-Curvature Functional as K-Space Filter: Applications in Magnetic Resonance Imaging of the Human Brain.....	23

Transient and Numerical Models of Three-Phase Induction Motor	24
Integrated Machining Process Modelling and Research System	25
Determination of Dangerous Lightning Current Levels for Power Substations 220KV	26
Regression Analysis of Experimental Data for the Soil Electrical Characteristics Considering Humidity and Frequency	27
Application of Recursive Methods for Parameter Estimation in Adaptive Minimum Variance Control of DC Motor	28
Simulation Framework for Realization of Handover in LTE Network in Urban Area	29
Routing and Traffic Load Balancing in SDN-NFV Networks	30
Model for Research of Li-Fi Communication.....	31
Social Media Changing the World.....	32
Modelling the Quality of User-Perceived Travel Experience.....	33
Digital Media, Field for Creativity	34
An Approach of Modelling of Breast Lesions	35
Three Dimensional Breast Cancer Models for X-Ray Imaging Research	36
Bioinformatics approach in finding similarity of Haemophilus influenzae and Escherichia coli	37
(2,3)-Generation of the Special Linear Groups of Dimension 9	38
(2; 3)-Generation of the Groups $SL_{10}(q)$	39
List of Participants	40

PROGRAM ACT 2018

Thursday, 21 June 2018

9:00	Registration	
10:45	Welcome and Conference Opening Amphitheatre	
11:00	Keynote speech I Amphitheatre	
12:30	Coffee break	
13:00	Session A Applied Computer Science	Session B Economy, Management and Sustainable Development
14:30	Lunch	
16:00	Session C Signal and Image Processing	Session D Power Systems & Electronics
17:30	City Tour Ohrid	

Friday, 22 June 2018

9:00	Registration	
9:30	Keynote speech II Amphitheatre	
10:30	Session E Telecommunications	Session F Information Society & New Media Art, Science and Tech.
12:00	Coffee break	
12:15	Poster Session	
12:30	Session G Biomedical Engineering	Session H Applied Mathematics
14:00	Closing Session Best Papers Awards	
19:00	Conference Gala Dinner	

Saturday, 23 June 2018

10:00	ACT EXPO event Amphitheatre
12:30	Coffee break
13:00	Social activities

An Overview of Local Approach for Time Series Analysis and Prediction

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Abstract. The most commonly used methods to forecast time series is to build a mathematical model based on the available information for the process to be modeled. In this paper the details and characteristics are examined of the local approach for univariate time series prediction based on historical data. The local modeling is presented as an improvement of the traditional global approach and as future work a hierarchical structure is shortly considered.

Keywords: Local models, time series, forecasting, prediction

Comparative Analysis of Algorithms for Classification of Text in the Bulgarian Language in Machine Learning

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Abstract. The topic of the publication is the research and comparative analysis of algorithms for the classification of text in the Bulgarian language using Machine Learning methods. The algorithms examined are: naive bayes classifier, multinomial bayes classifier, C4.5 , k-nearest neighbours, support vectors with optimization. The results are depicted analytically and graphically, and show that with 2 classes or fewer, and a low volume of data support vectors and C4.5 give the highest results. If the number of classes are doubled, the naive bayes classifier and the multinomial bayes classifier give similar results and are ahead of the other results. Running the algorithms with 20 or more classes results in poor accuracy scores across the board. The best performers with circa 55% are the naive Bayes classifier and support vectors with optimizing. The lowest accuracy is obtained from k-nearest neighbours.

Two-finger Touch on Wearable Device Bezel Method for User Pose Recognition

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Abstract. In the current paper we research if there is a relation between the user pose (standing, sitting or lying) and the position of two-finger touches on the wearable device bezel caused by the user hands posture differences. Finding and proving such relation will open many opportunities for improving computer-human interfaces of the wearable devices and the user experience. It could give the possibility for the devices itself “to learn” (via Machine learning methods) user behaviors not based only on the time when the interface is activated but also counting on the user pose. Applying such algorithms could push the device interface not to follow the pre-ordered and coded into the device OS or software menus’ flow but to start with the applications or the device settings which are typical for the user based on user pose recognition. It will reduce the device interaction time and the user efforts to complete the needed device input tasks. Knowing in which pose is the user and the day time it could be managed also the device display brightness, interface colours, icon style, etc. in order to provide better user experience and save the device energy.

Keywords: wearable, interface, smartwatch, pose recognition

Lagrange Method Implemented in Modeling and Simulation, Fundamentals of Animation, Creating Models and Motion of a Character

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Abstract. Modeling and simulation field uses different principles and tools for the execution of the models and the production of data for the system. The implementation of a simple simulation code on a PC might look like a simple task, but actually, it gives us more information than we think. For more complex systems are needed more complex simulations, implemented in a multi-computer environment, where the processing units are connected insightfully, in a high-speed network. This implementation requires better knowledge of computer architecture, distributed computing technologies, and the network. In this paper, we have implemented Lagrange method in the simulation part in order to prove its efficiency in the field of modeling and simulation. In addition to that, we have created different models using different shading, materials, lighting, modifiers, particle systems, physics, and constraints. Blender was used as a powerful tool in the creation of those models. A character has been created, adding rigging and making the bone structure while using the armature tool.

Keywords: Lagrange method, modeling, animation, simulation, Blender, Matlab

Development of a PLC-Based Hybrid PI Controller

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Abstract. The article describes a developed PI hybrid controller based on micro-PLC. The regulator has a conventional P composite and fuzzy I composite. The program is written with FBD, mainly using reference blocks, generators, and counters. Research has shown that the proposed controller has many tuning capabilities, allowing it to work well with objects with a very wide range of parameters.

Keywords: PI controller, fuzzy controller, PLC, FBD

Selecting the Optimal IT Infrastructure of a Data Center

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Abstract. The successful work of any organization in the modern world is dependent on the quality of the Data Center services used for this purpose. In order to meet the quality requirements of the services provided, it is necessary to make an appropriate design and to precisely select its structure and components. This paper demonstrates the use of the author's approach when choosing the optimal IT infrastructure and analyzes its work.

Keyword: data center, reliability, availability, business continuity, disaster recovery

Environmental Performance of High Risk Potential Enterprises in Devnya Municipality

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Abstract. Key indicator for environmental management systems' efficiency is environmental performance of organizations. Present research focuses on high risk potential enterprises in Devnya Municipality, in which certified environmental management systems are applied: “Solvay Sodi“ JSC, TPP “Deven” JSC and “Devnya cement” JSC. Environmental performance of organizations for a ten-year period (from 2006 to 2015 year). Conducted analyses proves that environmental management systems' implementation at investigated high risk potential enterprises leads to a significant improvement in their environmental performance.

Keywords: environmental management system, environmental performance, high risk potential

Integrated Environmental Management System in High Risk Potential Enterprises

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Abstract. In today's globalizing society, achieving and maintaining the balance between economic efficiency and environmental responsibility is a primary task. Paper presents an analytical overview of environmental management systems. A comparative analysis between the most frequently used environmental management systems in manufacturing enterprises is carried out. The analysis of high risk potential enterprises' experience in environmental management systems' implementation shows that there is an objective need to optimize the analyzing procedures and data interpreting of organizations' environmental performance.

Keywords: environmental management system, manufacturing enterprises, high risk potential

Employment of the Smart Contracts in the Practicing of the Franchising Business Model

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Abstract. Smart contracts which are based on the blockchain technology are not only a research interest of the Information and Communication (IC) sciences. Frequently, the interest for the smart contracts is accompanied by exploring their application dimension. The potential for use of smart contracts has been identifying in some business areas like insurance sector and in the so-called share economy. The main research challenge of this paper is to recognize the opportunities for application of smart contracts in the implementation of franchising business model. Through analysis of the main attributes of practicing the franchising business model, the paper will identify and suggest on the employment of the smart contracts as an added value in the process of employment and increase of the franchising business model efficiency.

Keywords: smart contracts, blockchain, application, franchising business model

Information – Technological Decisions in the Process Engineering for Company Management

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Abstract. In the following paper is discussed the necessity of new information-technological solutions in engineering the processes of company management in a dynamic environment. The interest shown to Business Process Reengineering (BPR) is not accidental. It is motivated not only by technological but only by economical premises. Characteristic feature of traditional reengineering is that it is directed exclusively to the inner company's processes and is being accomplished within the organizational borders of the establishment. But it is already exhausted and the look must be focused on its improvement in the form of a new, more refined kind – called X-engineering. Basic information-technological solutions, used within the borders of X-engineering are the Enterprise Resource Planning systems (ERP systems). Their base is integration of all data and processes into a combined, unified platform with database for all processes.

Keywords: ERP systems, company management, reengineering, X-engineering, business processes

Development of Wind Energy Projects in Bulgaria - Challenges and Opportunities

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Abstract. The demand of clean energy is increasing rapidly in the last two decades. The wind energy is the fastest growing sub-sector in Bulgaria. Present paper highlights the development trends regarding wind energy production and consumption in Bulgaria. Main challenges and legislation gaps, as well as opportunities respecting wind energy sector are tackled.

Keywords: wind energy projects, gross final energy consumption, grid, environmental impact

Innovative Information and Communication Technologies - a Precondition for a Higher Competitiveness of the Organization

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Abstract. Achieving and maintaining strategic competitive advantages is a prerequisite for the organization's higher competitiveness. In the conditions of highly competitive and open markets, maintaining a systemic advantage over others in business is an extremely difficult task, and this is the capacity of the leaders in the respective sector.

Of particular interest in theory and especially in practice is the question of achieving strategic superiority. There are many points of view on how to achieve a competitive advantage and hence a lasting superiority over other organizations in the business. Diversity stems from the fact that these advantages should be consistent and reflect the main factors determining the strategic positioning of the organization and its programming in the appropriate perspective. Innovation and the degree of integration of digital technologies into production processes are becoming increasingly important for the competitiveness of enterprises.

Keywords: information and communication technologies, competitiveness, industrial revolution, business environment

Smart Sustainable Development and Labor Migration in Europe, Eurasia and Balkan Region

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Abstract. The Europe and Eurasia region is well known as part of changes and migrations on global level. This paper discusses about the relationship between labor migration and poverty in EU, Eurasia and Balkan region, during a period of rapidly growing inequalities in well-developed and transition countries. This is placed against the on-going debates on changes in the patterns of employment and job creation, during the period of economic liberalization in transition countries, under the Smart Sustainable Development and Inclusive Growth policies, and also under the impact of the global financial crisis. The focus is on the migration patterns of different social groups in EU, Eurasia region in comprising with Macedonia and Belarus, analyses whether economic growth signifies a route out of poverty, and the specific policies that exist and should be improved and recommended. The paper states the Big Data helps with analysis of migration for policy developments and decisions related to saving or reducing migrants' level, developing a new policy and requirements on legal migration. This is directly relevant for policy and the Smart Sustainable Development and Inclusive Growth model and an inter-disciplinary approach to the study of migration.

Keywords: Sustainable Development, Inclusive Growth, Smart Development, Big data, global drivers, labor, migration, poverty

Application of Wavelet Functions in Signal Approximation

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Abstract. Wavelet functions are widely used in many mathematical and engineering fields. This paper discusses the capabilities of wavelet functions for approximation of different determinate signals. The purpose is to evaluate a set of wavelet functions for approximation of signals. M-functions in the Matlab programming environment are created. Haar, Coiflets, Symlets, Daubechies, biorthogonal and discrete Meyer wavelets are used. The efficiency of approximation is assessed. A comparative analysis of the used wavelet functions in terms of relative error of approximation and norm error of approximation using discrete wavelet transform is presented.

Keywords: approximation, Matlab functions, relative error, wavelets

Compression of Images Using Wavelet Functions

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Abstract. Recently, wavelet functions are widely used in a number of areas such as mathematics, physics, astronomy, medicine, and of course engineering. This article discusses the decomposition and compression of two-dimensional signals using wavelet functions. The efficiency of the performed wavelet compression is evaluated and analyzed.

Keywords: compression, decomposition of functions, Matlab, wavelet functions

The Use of the Intensity-Curvature Functional as K-Space Filter: Applications in Magnetic Resonance Imaging of the Human Brain

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Abstract. This paper investigates the feasibility of use of the intensity-curvature functional (ICF), high pass filters, and gradient images as k-space filters. The main signal processing technique used is the inverse Fourier transformation and the data is Magnetic Resonance Imaging (MRI) of the human brain. Data were fitted with the bivariate linear and the bivariate cubic Lagrange model functions. The key question that this work addresses is how to emphasize and highlight details in two-dimensional MRI through k-space filtering. The techniques adopted are two. The first one uses the ICF to filter in k-space: high pass filtered and gradient images; and it is termed ONE. The second one uses the k-space of the high pass filters and the k-space of the gradient images to filter the MRI, and it is termed TWO. The study shows that predominantly the technique termed TWO is more effective than the technique termed ONE. The ICF is suggested to be a novel k-space filter.

Keywords: k-space, intensity-curvature functional, magnetic resonance imaging, high pass filter, gradient.

Transient and Numerical Models of Three-Phase Induction Motor

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Abstract. The two different mathematical models of three-phase induction motor are derived in order to estimate the motor dynamic behavior during acceleration in different operating modes. The first model is derived from a set of differential equations applied and solved in Simulink. The second model and its set of differential equations are solved using numerical methods in Matlab. The analytical calculation, the experiment, the Finite Element Method (FEM) and the motor model in PSIM software verify the results of both motor transient models. The FEM motor model allows calculation of the magnetic flux density distribution in the motor's cross-section and in the air gap. Additionally, the torque is calculated in the FEM model for different operating speeds and its value is compared with the previously obtained results from the transient models.

Keywords: Induction motor, dynamic models, transient characteristics, FEM model.

Integrated Machining Process Modelling and Research System

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Abstract. This paper presents own developed research system for modeling of the metal machining process. The research system integrates measuring sensors and systems, computer interfacing devices, software and investigation methodologies in order to develop machining process models. Our own developed hardware and software solutions are part of the applied strategy for full control over the research measuring chain. The resulting machining empirical models are accompanied with uncertainty parameters in order to fit the criteria of application in Smart Machining Systems (SMS) and new manufacturing optimization techniques.

Keywords: integration, modelling, machining, uncertainty, smart systems.

Determination of Dangerous Lightning Current Levels for Power Substations 220KV

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Abstract. Lightning strike on an overhead power line cause overvoltages that spread in it, as waves. This waves can be dangerous for the equipment in electrical substations. The study of incoming waves is extremely important in the proper sizing and coordination of insulation in the electrical substations. This paper present results from model study of incoming waves due to lightning and determination of dangerous lightning current levels for power substation 220kV.

Keywords: lightning overvoltages, lightning current, overhead line, power substation

Regression Analysis of Experimental Data for the Soil Electrical Characteristics Considering Humidity and Frequency

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Abstract. The paper presents results from unplanned factor analysis of experimental data for the electrical characteristics of soils with different humidity, determined at different frequencies.

Equations for determining of the soil resistivity and dielectric permittivity depending on their value at 50Hz, different humidity and density of the soil for frequencies from 100kHz to 1MHz have been obtained as a result from a two-variable regression analysis.

Verification of the results authenticity and a graphical comparison between the experimental and computing results have been performed.

Keywords: electrical parameters of soil, soil resistivity, dielectric permittivity, regression analysis

Application of Recursive Methods for Parameter Estimation in Adaptive Minimum Variance Control of DC Motor

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Abstract. The recursive methods for parameter estimation have to meet the requirements for identification algorithms in real time adaptive control. This is determined from the fact that the adjustment of the model after the submission of new data from monitoring, and the development of new control action should be made in a single cycle of discretization. In this article is proposed an application of recursive methods for parameter estimation in adaptive self-tuning control of DC motor based on minimum variance. It uses a recursive estimator, based on several recursive parameter estimation methods and a linear controller obtained directly from the current estimates.

Keywords: adaptive system, instrumental variable method, least squares method minimum variance, recursive methods for parameter estimation, self-tuning control, DC motor

Simulation Framework for Realization of Handover in LTE Network in Urban Area

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Abstract. The LTE technology provides simultaneously voice, data and video with different priority on networks. LTE cellular network provides uninterrupted delivery of these services while on the move, and this is possible through the Handover procedure. In this paper is proposed a simulation framework for realization the Handover procedure in LTE technology into the urban area, which realizes the UE mobility, prioritizes the different types of traffic and reorder the resource blocks on UE after prioritization has been done. The implemented prioritization mechanism is used to study and improve the QoS parameters in LTE networks.

Keywords: 4G, LTE, Horizontal Handover, QoS

Routing and Traffic Load Balancing in SDN-NFV Networks

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Abstract. With the rapid development of Internet applications and the growing number of network services, the requirements for network communications are increasing. Network Function Virtualization (NFV) separates network functions from hardware and provides the flexibility of software-based network functionalities in addition to optimal shared physical infrastructure. The development of a Software-Defined Network and integrating it with NFV can help address a number of challenges to the dynamic resource management and organization of intelligent services. This paper presents the architectural benefits of SDN-NFV networks, the used routing techniques and the route balancing methods used for SDN and NFV networks.

Keywords: Network Function Virtualization, Software-Defined Network, Virtualization

Model for Research of Li-Fi Communication

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Abstract. This paper shows a developed physical prototype for transmitter and receiver sides of the Li-Fi devices. The proposed model has been tested and fully operational. The study of the model focuses on the influence of the distance and the transmission angle between transmitter and receiver in Li-Fi communication.

Keywords: Li-Fi, IoT, Wireless Communication

Social Media Changing the World

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Abstract. Social media refers to the means of interactions among people in which they create, share, and/or exchange information and ideas in virtual communities and networks. Some aspects of social media show that social media it is about conversations, community, connecting with the audience and building relationships. It is not just a broadcast channel or a sales and marketing tool. Social media touches ethical issues, we can speak about ethics of social media and how it can be used in order to make some idea or problem widely visible. There are already examples where social media had role in creating public opinion and bring some change. We can discuss is it that always right or sometimes is a result of manipulation. Ethical categories as authenticity, honesty and open dialogue can be key for work in social media. Emerging platforms for online collaboration are fundamentally changing the way we work, offering new tools to engage with individuals, communities, colleagues, partners, and the world at large. Social media have become the way to inspire, educate and connect.

Keywords: social, media, ethic, changes, world, collaboration

Modelling the Quality of User-Perceived Travel Experience

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Abstract. The conventional evaluation of transport systems considers the travel time as one of the largest costs of transportation. In this way, the traffic congestion has a negative impact on the economy and on the quality of citizen's lives. By having a more accurate and on-time information on the travel conditions simply by using the mobile services (e.g. suggesting alternative routes), citizens can avoid the traffic congestion. Depending on the context of travelling the passenger's travel time can be subjectively experienced as valuable time. In this direction, this research will find out how passengers perceive that a particular travel time brought a value for them. To be able to understand the end-user perceived travel experience we have proposed a concept of using the mobile sensing capability of travelers smartphone devices to be used for tracking and reporting the value of travel. This new concept will give multidimensional aspect to the value of a travel time for the end users. The main aim of this paper is to understand the individual preferences, behaviours and lifestyles that influence travel and mobility choices. In other words, what does the value of travel time mean for the end users, in relation to their quality of travel experience? The proposed model will identify the most influencing factors that have an impact on the quality of travel experience.

Keywords: travel time, travel experience, mobile sensing, perceived quality, value of travel

Digital Media, Field for Creativity

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Abstract. Connection of art and technology inspires new approaches to art motives, which bring new perspective to old ideas. New insides make culture reach with symbols and new meanings. Visual language and visual literacy, become new way of communication, integrating reach history of art.

The digital media have great potential; it is interesting and could be introduced to any artist or designer. Interpretation of results of the work with digital media, include digital media as it is, and its interdisciplinary connection with art, literature, music, film.

Creativity should use digital media, not becoming prisoner of it. From still images to animations to immersive environments, the range of forms and experiences appears limitless. Digital media is present in computer games too as way to express dimension and visual atmosphere. There is great potential and strength of the digital media. The hardware and software will continue to change, as well skills, interests, inspiration.

Comparison of traditional and digital media can bring new point of view to the issue. It is great opportunity to look at possibilities of artistic media and find how artistic sensibility can be expressed in many ways, in many forms.

Keywords: digital, media, art, creativity, innovation

An Approach of Modelling of Breast Lesions

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Abstract. The goal of this study is to create and evaluate a methodology for generation of realistic three dimensional (3D) computational models of breast tumors with irregular shapes and import them into real mammographic images. These hybrid images are to be used for development of new breast cancer detection technologies.

Keywords: simulation, irregular masses, breast, tumor, mammography.

Three Dimensional Breast Cancer Models for X-Ray Imaging Research

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Abstract. Breast cancer is by far the most frequently diagnosed cancer and the leading cause of cancer-related death among women worldwide. Despite technological advances, such as the digital mammography, the national screening programs, the introduction of the computer-aided design systems in clinical routine, screening and diagnosing of cancers hidden in breast dense parenchyma still remains a challenging task. The development, optimization and testing of new methods make an extensive use of both physical and computational cancer models. This paper addresses the methods used in generation of models of the breast cancer and their use in emerging x-ray breast imaging. Selected examples are presented from the current work of the biomedical engineering unit at Technical University of Varna, Bulgaria.

Keywords: physical and computational breast cancerous models, breast imaging techniques

Bioinformatics approach in finding similarity of *Haemophilus influenzae* and *Escherichia coli*

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Abstract. Nowadays, bioinformatics has become the most significant field in realizing the full potential of genomics. The explosion of new data management challenges pulls the need of interdisciplinary approaches in solving complex problems in life sciences. This paper describes an approach for genome analysis based on sequencing and assembly of unselected pieces of DNA from the whole chromosome. It is used high-throughput DNA sequencing to investigate differences in genome content. The analysis of *Haemophilus influenzae* consists of statistical sequence analysis of the whole genome as well as nucleotide sequence, protein and amino acid sequence analysis. The whole genome is analyzed, by using various bioinformatics functions, which give us both the statistical and visual representations of the sequences, in order to obtain more useful information and understanding. The research in this paper includes study of hydrophobicity in predicting the primary and secondary structure of the *H. influenzae* amino acids. The proposed genome analysis approach also includes finding Open Reading Frames (ORF) in order to predict the most probable coding region, which will make complementary depicting of the bacteria features. For the final goal of this study - finding the similarities of the *H. influenzae* and *Escherichia coli* genomes was using the method of global sequence alignment using the Needleman-Wunsch algorithm. The results from the research confirmed that *H. influenzae* and *E. coli* have similar genomes. This paper shows that, bioinformatics is one of the most capable toolset for making accurate analysis rapidly and effectively at a low cost.

Keywords: Bioinformatics, Genome analysis, Predicting primary and secondary structure, Global sequence alignment

(2,3)-Generation of the Special Linear Groups of Dimension 9

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Abstract. In the present paper we prove that the group $SL_9(q)$ is (2; 3)-generated for any q . Actually, to verify that fact, we provide explicit generators x and y of respective orders 2 and 3 for these groups. Our considerations are based only on the known list of maximal subgroups of $SL_9(q)$.

Keywords: (2,3): generated group.

(2; 3)-Generation of the Groups $SL_{10}(q)$

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Abstract. We prove that the special linear groups of dimension 10 defined over finite fields $GF(q)$ are (2; 3)-generated for any q . In fact, we provide explicit generators x and y of orders 2 and 3, respectively, for these groups.

Keywords: (2,3)-generated group.

List of Participants

Aleksieva, Veneta	10
Angelova, Tanya	17
Atanasov, Nasko	28
Avada, Habib	20
Bliznakova, Kristina	35, 36
Capeska Bogatinoska, Dijana	11
Ciulla, Carlo	23
Cornet, Yannick	33
Damoska Sekuloska, Jovanka	16
Dimitrov, Yuri	10
Dimitrova, Krasimira	19
Dimitrova, Rositsa	27
Dinev, Diyan	31
Erceg, Aleksandar	16
Genchev, Tsanko	38, 39
Gencheva, Elenka	39
Gospodinova, Galya	35
Grigorov, Ivan	28
Haka, Aydan	29
Ismajloska Starova, Nola	32
Ismajloska, Mersiha	34
Ivanova, Milena	27
Kalcheva, Neli	9
Karadimce, Aleksandar	33
Koteska Lozanoska, Daniela	20
Kuzinovski, Mikolaj	25
Lugano, Giuseppe	33
Mihaylova Kindzhakova, Elena	14, 15
Nikolov, Ventsislav	8
Nureddin, Sharif	20
Panayotova, Tanya	17
Parvanova, Reneta	21, 22
Radkov, Rosen	13
Rechkoska Shikoska, Ustijana	23

Risteski, Filip	23
Sandjakoska, Ljubinka	37
Sarac, Vasilija	24, 25
Sharkoska, Andrijana	11
Simeonova Toneva, Daniela	14, 15
Siniak, Nikolai	20
Stanchev, Danail	26
Stankova, Todorka	18
Stefanov, Goce	24, 25
Tabakov, Konstantin	38, 39
Todorov, Dimitar	30
Todorova, Mariyana	21, 22
Tomov, Mite	25
Toneva, Daniela	18
Trajchevski, Neven	24, 25
Uzunov, Vesko	12
Valchanov, Hristo	30
Vasileva, Margreta	26
Vasileva, Margreta	27
Veljanovski, Dimitar	23
Viktoriya, Moroz	20
Yordanova, Marinela	27

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