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The 3rd International Conference

INNOVATIONS AND CREATIVITY

PROGRAM

ABSTRACTS

June 6 – 8, 2019

Liepaja, Latvia

3rd INTERNATIONAL CONFERENCE "INNOVATIONS AND CREATIVITY" ABSTRACTS
Liepāja University, Liepaja, Latvia

EDITORS

Dace Kūma, Dina Barute

LAYOUT

Dina Barute

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PROGRAM

FRIDAY, JUNE 7

9:00 – 10:00	Registration Welcome Coffee
Plenary session	**(Hall, 4th floor)**
10:00 – 10:20	Opening of the conference
10:20 – 10:40	Cathrin Frisemo. Human(e) In Tech - Creativity is the art of survival and innovation
10:40 – 11:00	Mahmoud Rostampour. Predicting future,by using AI !
11:00 – 11:20	Åke Amundin. How new legislation initiates the development of a new instrument
11:20 – 11:40	Gerd Michelsen and Raimonds Ernsteins. Innovation and creativity in higher education for sustainable development
11:40 – 12:00	Saulius Jusionis. Knowledge transmission, innovation and technology
12:00 – 13:00	**Lunch time**
13:00 – 14:30	**Sections**
Innovations in Computer Science	**(Room 227)**
13:00 – 13:15	Uldis Žaimis and Kitija Kuduma. Use of Information Technologies for Road Pothole Detection and Volume Calculation
13:15 – 13:30	Jānis Kapenieks. Web based fast and reliable text classification tool
13:30 – 13:45	Vaidas Giedrimas. Recursive AOP for reversible software
13:45 – 14:00	Jūratė Vaičiulytė. Recursive Dirichlet Hidden Markov Model Parameter Estimation Algorithm
14:00 – 14:15	Donatas Kavaliauskas and Leonidas Sakalauskas. Study of convergence in metaheuristics algorithms
14:15 – 14:30	Ernesta Molotokienė. Rethinking Radical Imagination: Ethics of Artificial Intelligence
Environmental Science	**(Room 225)**
13:00 – 13:15	Daiva Stanelytė and Virginijus Radziukynas. Method Analysis of Size Determination of Renewable Energy Battery
13:15 – 13:30	Roberts Jurmalietis, Armands Grickus and Ance Elstina. Marbled crayfish survival and propagation in experimental microcosm aquaculture
13:30 – 13:45	Viesturs Kalnins. Model of simple tool for profitability calculations of waste plastics recycling into fuel by pyrolysis in automotive industry
13:45 – 14:00	Tatjana Paulauskiene and Ieva Paulauske. Cellulose Aerogels: Production, Research & Applications

14:00 – 14:15	Mantas Rakevicius. Water Quality Management with IoT in Large Industrial Territories
Art and Mathematics	**(Room 240)**
13:00 – 13:15	Vakaris Bernotas. The Secret of Creativity - Fail Better. 38 years of teaching and sharing creativity
13:15 – 13:30	Inta Klasone. Formation of the Creative Experience of Students in the field of Art Education
13:30 – 13:45	Ieva Gintere and Kristaps Biters. Art Space: An Experimental Digital Art Game
13:45 – 14:00	Kārlis Dobelis, Dace Kūma, Dina Barute, Dzintars Tomsons and Anita Jansone. From Mathematics to the AI in Liepaja University
14:00 – 14:15	Elman Dzhambetov, Khedi Taramova, Iman Shudueva, Patriks Morevs and Maksims Zhigunovs. Properties of power residues of natural number in various numbering systems
14:15 – 14:30	Sigita Turskienė and Arvydas Juozapas Janavičius. Modelling of Nonlinear Thermodiffusion From a High Intensity Spherically Symmetric Source
14:30 – 15:00	**Coffee break** **(Room 219)**
15:00 – 17:00	**Sections**
New technologies and approaches in education	**(Room 227)**
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15:15 – 15:30	Stefan Karolcík, Inga Zilinskiene, Asta Slotkiene and Elena Cipková. Analysis of e-Learning Environment for Geography: Opportunities for Personalized Active Learning
15:30 – 15:45	Jelena Revzina and Jelena Baranova. Cybersecurity courses integration into study programme: challenges and future
15:45 – 16:00	Lasma Ulmane-Ozolina. Knowledge management tool in the learning processes
16:00 – 16:15	Jelena Turlisova and Anita Jansone. The Computerized assessment of the perception of visual - motor skills
16:15 – 16:30	Valdis Priedols and Anita Jansone. Virtual laboratory: a tool for e – learning
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16:45 – 17:00	Kristine Mackare, Anita Jansone and Ilja Konarevs. The prototype version for e-material creating and formatting application
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15:15 – 15:30	Ivars Kudrenickis, Gaidis Klāvs, Jānis Reķis and Aija Zučika. Building social and local acceptance of on-shore wind energy
15:30 – 15:45	Lilita Abele, Baiba Rivza and Sharif E. Guseynov. On the issue of determining the weights of composite indicators on Europe's digital performance in deriving the Digital Economy and Society Index
15:45 – 16:00	Olga Anne and Dovile Aleknaviciute. The Role of the Pollution Prevention Tools in the Environmental Strategy of the Industrial Companies
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15:15 – 15:30	Sharif E. Guseynov and Jekaterina V. Aleksejeva. Modelling of dynamics and influences of the coastally trapped waves in the Baltic Sea coastal areas with a complex coastline geometry: as a case study of the central part of the Southeast Baltic Sea coast
15:30 – 15:45	Sharif E. Guseynov, Yadulla H. Hasanli and Jekaterina V. Aleksejeva. Development, investigation and analysis of the model of repayment of mutual credit and debit liabilities between the entities (countries, regions, large enterprises, economic legal players, etc.)
15:45 – 16:00	Sharif E. Guseynov and Jekaterina V. Aleksejeva. On an approach to logical-probabilistic diagnosing the state of technical systems by the detected direct and indirect diagnostic indicators
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ON THE ISSUE OF DETERMINING THE WEIGHTS OF COMPOSITE INDICATORS ON EUROPE'S DIGITAL PERFORMANCE IN DERIVING THE DIGITAL ECONOMY AND SOCIETY INDEX

Lilita Abele[1], Baiba Rivza[2], Sharif E. Guseynov[1,3]

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Keywords: Digital Economy and Society Index, digital evolution of EU Member States, weight of indicator, inverse parameter identification problem

The Digital Economy and Society Index (DESI) is a flexible interactive tool for measuring the progress of states EU members in relation to the digital economy and society. As indicated in [1], DESI is calculated as the weighted average of the five main dimensions / criteria, some sub-dimensions / sub criteria and some individual indicators (the total number is 35). It is important to note that given weights were determined, as indicated in the annexes to the source [2], by experts of the European Commission, and, as indicated in [3], these weights are weighted average and normalized weights. However, none of the numerous sources and applications of the European Commission states: (a) Which of the two possible types of expert assessments do these weights belong to - individual or collective estimates? (b) Which of the quantitative or qualitative expert assessment methods was used in determining these weights? (c) By what principle / law is the normalization carried out? (d) According to what rule / law weighted average of 5 measurements, 14 sub-measurements and 35 indicators was calculated?

In this paper, the authors try, using the rich apparatus of the theory of inverse and ill-posed problems [8]–[10], in particular, the methods of inverse problems of parameter identification, to investigate two problems:(1) determine the weights of all 14 DESI sub-dimensions based only on the known values of 35 indicators of 28 EU countries for the period 2014-2018, and then, using the found sub-measurement weights, calculate the weights of all 5 measurements of DESI; (2) to identify the measure of the influence of each of the DESI parameters on each other, where the parameters imply indicators, sub-dimensions and measurements of DESI.

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BENEFITS FROM ANALYZING VIDEO LECTURE LOGS WITH LEADING BUSINESS ANALYTICS TOOLS

Linda Alksne[1], Valdis Priedols[1], Anita Jansone[1], Zane Bērzkalne[2]
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[2]Riga Technical University, Latvia

Keywords: **L**earning analytics, Business intelligence, Power bi, Tableau, Video lecture, Logs, Business analytics tool

By investing time and resources in learning analytics, students, faculty, and administrators can improve learning and course outcomes, and develop more engaged and effective teaching and learning techniques. Learning analytics provides feedback to individual students and faculty, but can also surface trends across schools or other scopes of interest. This paper is dedicated to Learning analytics. Authors have analyzed logs from Universitat Politècnica de València video lecture recording and management system. UPV is using The Paella Player which is an Open Source Javascript video player of the Opencast Community. Logs have been analyzed with two different data and analytics reporting tools – Power Bi and Tableau from different point of views. Also the results from two different study years have been compared. Paper includes results from both business analytics tools, conclusions about the tools and also results that can be used for improve and benefit multiple audiences from university.

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HOW NEW LEGISLATION INITIATES THE DEVELOPMENT OF A NEW INSTRUMENT

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Combinova AB, Sweden

Keywords: Magnetic fields, Measurments, EU Directive 2013-35, Human exposure to EMF, R&D process

EU-directive 2013-35 on limitation to workers exposure to EMF leads to need for improved field meters

The paper will cover:

- How scientific research lead to the EU Directive
- The process of defining the specification of requirements for the new
- instrument
- The R&D-process in Stockholn, Sweden with design of Hardware, design of firmware and design of PC-software
- Presentation of the result – Field Detector FD 10
- Demonstration of the new instrument and PC-software at the exhibition at the international conference in Liepaja.

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THE ROLE OF THE POLLUTION PREVENTION TOOLS IN THE ENVIRONMENTAL STRATEGY OF THE INDUSTRIAL COMPANIES

Olga Anne[1], Dovile Aleknaviciute[2]
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[2]Klaipeda University, Lithuania

Keywords: Sustainability, Resources, Environmental impact, Decoupling, EMAS

The twentieth century of humankind is the true age of life with tremendous progress in civilization, accompanied by new scientific approaches, technological innovations, and the huge and rising use of the Earth's resources. Unfortunately, this irrational use of resources has led to their over-exploitation and, as a result, to their depletion. There is a perception that without further regulation of economic growth and overfishing of resources, the entire Earth's ecosystem can be irreparably ruined. In 2015, the United Nations General Assembly has presented the 2030 Agenda for Sustainable Development. The Agenda is based on the decoupling principle, which means that the economic growth of the manufacturing and service sectors must be faster than the consumption of natural resources and energy. To this end, countries around the world have developed and are still pursuing different environmental measures, such as regulations, laws and orders, tax, etc. These measures are mandatory, but there are also voluntary schemes, such as eco-labeling, life-cycle assessment, and environmental management systems. The most popular management systems in Europe are ISO 14001 and EMAS. These systems are the tools to undo. They are considered effective in reducing the negative environmental impact of enterprises and organizations. A large number of countries that have received an EMAS certificate will no longer renew their registration after some time. Due to the non-extension of EMAS registration, there is a need to analyze the effectiveness of the environmental management system. The article discusses the methods of sustainable development of economic activity and the approach to the use of resources, as well as methods for assessing the impact on the environment. The study selected three production companies operating in Lithuania, which currently uses a pollution prevention tool - the environmental management system. The aim of the paper is to analyze the effectiveness of environmental pollution reduction measures at Lithuanian manufacturing companies. Comparative analysis of enterprises' resources utilization before and after EMAS implementation has been fulfilled applying statistics as well as decoupling methods. The results

of the study shown that each target company is differently managed to improve the efficiency of usage of their resources, such as water, electricity, gasoline or diesel, once EMAS has been installed.

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THE SECRET OF CREATIVITY - FAIL BETTER. 38 YEARS OF TEACHING AND SHARING CREATIVITY

Vakaris Bernotas
Vilnius Academy of Arts /Faculty of Klaipėda

Keywords: Talent, Skill, Ability, Creativity

We live in the times of constant change. Things have always been this way, they are this way today and forever will be. The only difference of today is - the speed of change, that is increasing. The change has come into universities; the internet has taken under his charge the monopoly of knowledge. The value has left its position from craft to creativity. Not products, nor knowledge, but the ideas are becoming the biggest capital.

I do not think, that a human being can be taught creativity. You are given the tools for creativity to the other, but you cannot make him creative. Here we find the key to the secret of academicals studies - we can learn from each other. One ancient text speaks this old truth: In fact, everybody is a separate universe. Today, the science of genetics has approved this theory. Everybody is unique. The Contemporary Art Center (CAC), located in the city Vilnius holds a sign - *Everybody is an artist. But only the artist knows this.* Everyone has talent and ability. We are all different. Our talents are different. This difference makes our world beautiful. How to find and define our talent? We need to develop skills to build up our talents. This is the purpose of program Self Branding. Its purpose is to understand and showcase our talent. Its main task is to create a professional design portfolio. The portfolio has to consist of professional material, that students are creating during the study course. In order to achieve this task and live a creative life, it is necessary to answer three questions: Who I Am? What do I want? How to achieve it? In the beginning of Self Branding course we make an agreement to follow 5 principals for successful creative design studies:

1. Cooperation - working together.
2. Open-Mind - sharing our creativity.
3. Tolerance, using only constructive critics.
4. Positive attitude - choosing smile, instead of fear.
5. Staying truthful - no lie to ourselves or others.

Every week, students bring their works to the lecture, which are analyzed together as a group. This is our main study tool, that we repeat all year long. It results in incredibly fast personal development for each student.

At the beginning most of the students are shy and scared. They are afraid of making mistakes. To be ourselves is our biggest strength, that we have learned to control, no one wants to stand out, because we fear being

misunderstood. Students overcome this fear by working and learning together as a group. Togetherness in learning helps to overcome the fear of failure. Students gain the skills to learn not only from their own mistakes, but also the mistakes of others. This influences the change towards bettering ourselves a creator. It is possible to develop the feeling of harmony and visual hearing. Together we learn new points of viewing the same information, and stepping back from our achievements. The process of discovering your true self and talent bring happiness and joy.

FROM MATHEMATICS TO THE AI IN LIEPAJA UNIVERSITY

Kārlis Dobelis, Dace Kūma, Dina Barute, Dzintars Tomsons, Anita Jansone

Liepaja University, Latvia

Keywords: Mathematics, Computer science, History of Faculty of Science and Engeniering in Liepaja Univerity

In 1954 in Liepaja was founded Liepaja Pedagogical Institute, where also were prepared teachers of mathematics and physics. Professional courses on mathematics were conducted by staff of Mathematics department.

During years name and study programs of the instute were changed several times and now it is Liepaja University with 4 faculties, one of them - Faculty of Science and Engeneering (FSE) - was developed from initial Mathematics department. Now the main accent in the FSE is on various topics of IT, including internet of thing, data quality ect.

In the report will be considered history of development of mathematical science in Liepaja University from the beginnings up to nowadays, main research topics in various periods and their impact on the relevant time period and vice versa.

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PROPERTIES OF POWER RESIDUES OF NATURAL NUMBER IN VARIOUS NUMBERING SYSTEMS

Elman Dzhambetov[1], Khedi Taramova[1], Iman Shudueva[1], Patriks Morevs[2], Maksims Zhigunovs[2]
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Keywords: Comparison, Modulo, Modulo residuals, Residue classes, Power residues

Power residues of natural numbers in modulo 〖10〗^(k), where k takes values 1, 2, …, 10 are considered as well as properties thereof. Those single-digit, two-digit, three-digit numbers are outlined, which have natural powers comparable to the number itself. Validity of such property for given numbers is shown.

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HUMAN(E) IN TECH - CREATIVITY IS THE ART OF SURVIVAL AND INNOVATION

Cathrin Frisemo
CreativtFri, Sweden

Keywords: Creativity, Innovation, Healthy places to work, Leadership, New world of work

Despite the high focus on the benefits and importance of technology development, we are still humans, with basic needs. (Maslow's hierarchy of needs). The fundamental need is to stay healthy, and the basics for life and living a life that we want, creating and innovating better conditions for an enjoyable life.

Feeling good is our natural state of being, and it's what we're striving for and levitating back to throughout life. And it is also the driving force behind tech development and what puts us in contact with our creativity. Better living conditions in several aspects have driven humans to continuously strive for improvement within each and everyone's area of interest. And where the technical development plays an important role.

Creativity is our core, and it forces us to move on or else we feel bad and stuck. Our power of creativity needs to be expressed, and it applies to every one of us since we are all born creative.

We only have different ways of expressing it, and wither you do it as a researcher, an artist or a soccer player to feel good we need to be in contact with and stay creative to exceed and improve not so much in comparison to others, but for our good and satisfaction.

Our lifestyles have rapidly changed following the tech development and developed a society and life that is not following our basic needs such as, e.g., good and enough sleep, nutritious food, and water and to move and to rest. We don't even get enough daylight since we spend about 90% of our time indoors, and our circadian rhythm disrupts. The 24/7 lifestyle is making most of us jetlagged year around, damaging our health and with an impact on our creativity. The emerging digital society with a new lifestyle is causing several lifestyles related diseases and new challenges to stay healthy and creative.

A healthy and sustainable environment is yet another factor crucial for our survival. And it applies to both outdoor and indoor environments, arenas that are of importance for sound, health-promoting places to work.

Working life is changing from being a place to go to; now work is instead something you do. And natural meeting places, like work, are decreasing and new meeting places need to be created. We are humans and need interaction, and it can very favorably be facilitated by technology, yet still, we need and

long for a real face-to-face interaction over a coffee, dinner, at conferences, etc.

Leaders play an increasingly important role, being role models and expected to walk their talk, being transparent and authentic. We need a mindset of that it's now about leading people and not managing machines. That is, so we are to stay creative and human(e).

So, keep the humanity in tech – be human(e) in tech to stay healthy, and for maintaining creativity, innovation and leading for success. We are still all human beings no matter the advanced innovative technology we create.

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RECURSIVE AOP FOR REVERSIBLE SOFTWARE

Vaidas Giedrimas
Siauliai University, Lithuania

Keywords: Reversibility, Recursive algorithms, Programming languages, Aspect oriented programming

Innovative paradigm of reversible computing (RC) is on the focus of current computer science. The main idea of it is to enable the execution of programs not forward only (as it is now) but backwards as well. The set of possible applications of RC includes software debugging, fault-tolerance increasing and quantum computing. In order to do reversible computing operational there is a need to code (manually) or to generate opposite "reverse" element for each "forward" element. However, this emerging paradigm still needs the methods for expressing opposite language elements in advance (during design-time).

In other hand, Classic Aspect oriented paradigm (AOP) helps to deal with crosscutting concerns such as security, transactions etc. in design time, allows to separate development tasks by proficiency instead of by modules and to run weaved program in the run-time.

In this paper author present the idea to express opposite language elements by using recursive aspects.

ART SPACE: AN EXPERIMENTAL DIGITAL ART GAME

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[2]Liepaja University, Latvia

Keywords: Digital art game, Knowledge transfer, Aesthetics of modernism, Photorealism, Futurism

Art Space is an experimental digital art game that is being created in collaboration between researcher, Dr.art. Ieva Gintere (Vidzeme University of Applied Sciences, Latvia) and the game artist, Mag.art. Kristaps Biters (Liepāja University, Latvia) in the framework of a post-doctoral project led by Ieva Gintere between 2018-2021 with financial support from the European Regional Development Fund. The concept of the new art game is focused on its historical heritage. The aim of the game is knowledge transfer: the author is carrying out research into the aesthetics of contemporary games in order to transfer the results of the research to the game's players. The game represents the aesthetics of the art games inherited mainly from modernism, through trends such as pixel art, glitch, noise, hacking, vaporwave, and generative art. They help to categorize art games according to their aesthetic features. The current paper underlines the trends of photorealism and futurism. The aforementioned tendencies function as a means of expression in the Art Space game.

The game is intended to be a building/constructing game like the famous The Sims (2000) and Minecraft (2011). While activating the respective trends in a palette of effects, the player will be introduced to the historical antecedents of the art game. The game will familiarize the player with its historical context, and encourage him/her to form individual artefacts. The project hopes to raise the interest of a wide-ranging public in contemporary art and music, point out the newest creative tendencies in art, and describe the potential audio-visual language of art in the near future.

Art Space represents the field of art games (also known as artgame, arthouse game or artist game). The aim of this research is to transfer the accumulated knowledge of modernism into contemporary digital games. The goal of Art Space is to incorporate the results of research into existing art games and reflect their historical heritage. It is built on the basis of an aesthetical analysis of the art games produced since 1999 up to 2018. The games are classified according their historical antecedents in the audio-visual arts such as cubism, dadaism, fluxus, and others. The citations concerning art games, visual art and music that already qualify as part of the classical repertoire, are included in the new game. The references to the other games

and pieces of art will serve as educational items for the player of the game. He/she will be invited to create an individual artistic space using the effects and elements from the palette of the game, and each of those means of expression will be accompanied by their historical antecedents. For instance, by using the effect of photorealism, the player could be introduced to art games like Dear Esther (2012) that represent photorealism in the contemporary art game area, and to the antecedents of photorealism from the era of modernism.

POSTER

OPPORTUNITIES TO IMPLEMENT THE HOLLOW PRINCIPLE

Olga Glikasa, Ludmila Karule
Liepaja University, Latvia

Keywords: Hollow principle, Environmental and health education, Interrelationship of natural elements

In the poster are considered natural elements and phenomena in the learning process should be seen in their interrelationship.

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MODELLING OF DYNAMICS AND INFLUENCES OF THE COASTALLY TRAPPED WAVES IN THE BALTIC SEA COASTAL AREAS WITH A COMPLEX COASTLINE GEOMETRY: AS A CASE STUDY OF THE CENTRAL PART OF THE SOUTHEAST BALTIC SEA COAST

Sharif E. Guseynov[1,2,3], Jekaterina V. Aleksejeva[1,4]

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Keywords: Baltic Sea coastal, Coastally trapped waves, Mathematical modelling, Nonlinear-dispersive model

The most complex stage in the life of coastally trapped waves is associated with the processes that occur when a wave approaches the coast, and when a wave penetrates into the enclosed defined areas of water (such as bays, harborages, etc.), and when a wave has interacts with the ground relief's peculiarities, with the adjacent land, as well as with the anchored and/or floating bodies. If we confine to considering the Southeaster Baltic Sea coastal area, then the characteristic parameters of the considering processes (such as the size of defined areas of water, the size of bodies, the speed of coastally trapped waves, etc.) are such that in the course of mathematical modelling we can ignore the influence of viscosity and, consequently, the foregoing processes can be reasonably solved on the basis of models of an ideal incompressible fluid.

In the present paper, we will lead the conversation on such mathematical models – linear/nonlinear and linear/nonlinear-dispersive models, – which are constructed within the scope of approximate hydrodynamic models of shallow water under various approximation orders.

As an another approach to studying the dynamics and influences of coastally trapped waves is the so-called complete modelling, in the course of construction of which the restrictive assumptions on the wavelength, amplitude, invariability of fluid parameters by depth, etc. are not required. However, a complete modelling also requires some assumptions (for example, the assumption on non-vorticity of potential flow of fluid with a free boundary, etc.), which are often no less restrictive than the assumptions made in the course of approximate modelling. Besides, the corresponding design algorithms based on complete models require large computational burdens, as a result of which they are not intended for efficient and prompt

computing, and they are intended only for a priori study of the influences of waves on isolated fragments of the coast by creating certain model situations. Therefore, the development and modification of approximate models for the description of both coastally trapped waves and surface waves continues to be relevant.

In the present paper, in the course of modelling the dynamics and influences of coastally trapped waves, the key research questions are: (a) description and calculation of the interaction of coastally trapped waves with a fixed partially immersed body; (b) description and calculation of the effects of coastally trapped waves to the elements of the coastal sloping structures, to the through constructions, to the streamline and floating hydraulic structures; (c) description and calculation of the effects of the coastally trapped waves to the littorina bay mouth bars (called also bay bars or bay-barriers) of the accumulative-lagoon shores of the central part of the Southeast Baltic Sea coast; (d) calculation of the propagation and transformation of long waves under they move away from the coast. On the basis of the obtained results, it is possible to create a uniform system for the operating forecasting and warning about critical abrasions of the undersea slope and shores.

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ON AN APPROACH TO LOGICAL-PROBABILISTIC DIAGNOSING THE STATE OF TECHNICAL SYSTEMS BY THE DETECTED DIRECT AND INDIRECT DIAGNOSTIC INDICATORS

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Keywords: technical failure, Boolean algebra, technical systems, cause-effect relation

Technical diagnosis is the scientific and engineering discipline that studies and establishes indications of defects in technical equipments and objects, as well as the methods and means used to search for and detect defects. The principal concern of technical diagnosis is the organization of an effective check on the proper working order and functioning of technical equipment and objects – individual components, subassemblies, blocks, stock, devices, aggregates, and systems – as well as checks on processes for transmitting, processing and storing material, energy and information. Thus, technical diagnosis fundamentally deals with organizing the processes of diagnosing the technical state of objects during manufacture and operation, including before, during, and after use of the objects, and during preventive maintenance, repair, and storage. Technical diagnosis is one of the most important measures used to ensure and maintain the reliability of technical equipments and objects.

The development of a diagnostic methods includes study of: technical equipment and object; object's possible defects; indications of such defects; compilation of mathematical models of equipment and object in proper working order and in nonoperational condition; construction of diagnostic algorithms; adjustment and testing of the system. In studying the objects to be examined, a classification of the objects according to various features is of prime importance: for example, according to the nature of the change in the values of the parameters or according to the type of energy required. Defects are studied in order to determine their nature and causes, the probabilities and physical conditions of their occurrence, and the conditions for their detection.

In the present paper, the possibility of applying the logic algebra methods for diagnosing technical systems under an incomplete set of diagnostic

indicators identified at a given time moment is studied. Diagnostic indicators – both direct and indirect – are representative parameters, which have to use to the state estimate of a technical system: the direct indicators characterize the state of a technical system, while the indirect indicators are related to the direct indicators by way of functional dependence. In the work, the concept of the probability of having failure is introduced for a technical system, a formula for calculating probability of faultiness is proposed, and finally, a probabilistic table of the system's faultinesses is constructed based on calculated probabilities.

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DEVELOPMENT, INVESTIGATION AND ANALYSIS OF THE MODEL OF REPAYMENT OF MUTUAL CREDIT AND DEBIT LIABILITIES BETWEEN THE ENTITIES (COUNTRIES, REGIONS, LARGE ENTERPRISES, ECONOMIC LEGAL PLAYERS, ETC.): AS A CASE STUDY OF THE TOP-20 LARGEST ENTERPRISES OF THE BALTIC COUNTRIES

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Keywords: Mutual liabilities, Mathematical modelling, Debt-liquidation multiplier, Keynes's investment multiplier

Mutual liabilities are a part of normal contemporary relations between any entities: between whole countries, between country regions, between large enterprises and companies, between other economic legal players, between banks, etc. However, in case of a systemic crisis (not only) an economic system can be paralyzed by an enormous amount of mutual debts. In this case, to prevent bankruptcy of a large number of involved entities, it is necessary to employ efficient algorithms for debt liquidation. Unfortunately, algorithms that allow finding the necessary volume and recipients of government or other kinds of subsidies, as well as define when, whom and how much each of the problem involved entities should repay, have not been developed.

In this paper, we make a formal definition for a problem of full liquidation of mutual liabilities in the system for a case when the involved entities are prohibited to use government or other finance sours money in their internal projects before they fully repay their external debts. After that, we present the mathematical model and special algorithms for solving this problem. In this paper, the offered model and algorithm are applied to both model problem and the real existing TOP-20 largest enterprises of the Baltic countries.

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MODELLING OF NONLINEAR THERMODIFFUSION FROM A HIGH INTENSITY SPHERICALLY SYMMETRIC SOURCE

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Keywords: Nonlinear heat transfer, Approximate analytical solution, Temperature profiles, Spherically symmetric case

Heat transfer in gases can carry a kinetic energy based on nonlinear diffusion of gas molecules from the hottest regions to the coldest ones with a finite velocity by random Brownian motions.

In this case heat transfer in gases can be described by using nonlinear thermodiffusion [1] equation for spherically symmetric source with the nonlinear thermodiffusion coefficient proportional to the temperature

$$\frac{\partial T}{\partial t} = \frac{D_S}{T_S r^2}\frac{\partial}{\partial r}(Tr^2\frac{\partial}{\partial r}T), \quad D_S(T) = \frac{K(T)}{\rho \cdot c_p} = \frac{k\bar{v}}{\sqrt{2}\pi d^2 p T_S}T = \frac{D_S}{T_S}T \qquad (1)$$

Here $K(T)$ is a coefficient of thermal conductivity proportional to temperature T, depends on the diameters d of gas molecules, $\bar{v}$ - mean value of molecular movement, c_p - heat capacity of gases at constant pressure $p = nkT$ at T_S - high temperature of point source.

The solution $T(\xi)$ of nonlinear differential equation (1) can be realized by introducing similarity variable ξ (2) [1] with maximum values ξ_0 and coordinates r_0

$$T(\xi) = T_S f(\xi), \quad \xi = \frac{r}{\sqrt{D_S T_S \cdot t}} = \frac{r}{\sqrt{D_S t}}, \quad r_0 = \xi_0\sqrt{D_S T_S \cdot t} = \xi_0\sqrt{D_S t} \qquad (2)$$

$$f\frac{\partial^2 f}{\partial \xi^2} + \frac{2}{\xi}\cdot f\frac{\partial f}{\partial \xi} + \left(\frac{df}{d\xi}\right)^2 + \frac{1}{2}\xi\frac{\partial f}{\partial \xi} = 0, \quad \frac{df}{d\xi} + \frac{1}{2}\xi = 0 \qquad (3)$$

The approximate analytical solution $T(\xi)$ of obtained equation (3) satisfies the following boundary conditions

$$f(\xi) = 1 - \frac{1}{4}\xi^2, \quad T(\xi) = T_S f(\xi), \quad T(0) = T_S, \quad T(\xi_0) = 0, \quad \xi_0 = 2 \qquad (4)$$

The obtained solution is useful for technical applications.

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KNOWLEDGE TRANSMISSION, INNOVATION AND TECHNOLOGY

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Keywords: Knowledge, Transmission, Innovation, Technology

Today's economy and the well-being of citizens depend on knowledge and their transformation. The EU knowledge society and the knowledge economy are linked to research and innovation and are understood as both a social phenomenon and economic development.

Knowledge Commerce is the sale of knowledge using various forms of electronic communication and direct channels.

The process of transferring messages is most often understood as the transfer of valuable scientific knowledge from scientific institutions to business enterprises.

There is a formula for interaction between information, knowledge, and intelligent solutions:

Data + Context = Information

Information + Experience = Knowledge

Knowledge + Insight + New Technologies + Highly Qualified Human Resources = Wise Solutions.

Scientific institutions in the modern world are the most important source of a variety of new technologies and their equitable innovations.

Design Innovation Centre of Vilnius Academy of Arts

Established in 2007.

Aim of Design Innovation Centre

Promote collaboration between Vilnius Academy of Arts and businesses.

DEVELOPMENT OF DESIGN INNOVATION CENTRE OF VILNIUS ACADEMY OF ARTS

Aim of the project

Develop the activity of Design Innovation Centre of Vilnius Academy of Arts seeking more active collaboration between science and business and thus greatly increasing the value of agreements with business and public sector.

MARBLED CRAYFISH SURVIVAL AND PROPAGATION IN EXPERIMENTAL MICROCOSM AQUACULTURE

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Keywords: Marmorkrebs, Indoor aquaculture, Ecotechnology, Detritus

Ornamental marbled crayfish / marmorkrebs *Procambarus virginalis*, traditionally perceived exclusively as a threat to European indigenous freshwater fauna, lately has been discussed to be a potentially valuable source for food industry and, accordingly, marmorkrebs commercial aquafarming should be admitted as a worthwhile issue for crustacean studies.

Recent research focuses on marbled crayfish cultivation in indoor microcosm tanks chosen because of safety (since interior environment prevents specimens release in wild) and easy-to-sustain considerations. Set of ecological microcosm experiments with mathematical tools included have been planned to study low-maintenance possibilities for marbled crayfish indoor farming, especially as regards to their feeding. The latter, i.e. marmorkrebs diet related experiments will particularly emphasize utilization of plant detritus since it represents itself promising (i.e. cheap and environmentally friendly) but still contradictory valued food resource for crayfish.

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MODEL OF SIMPLE TOOL FOR PROFITABILITY CALCULATIONS OF WASTE PLASTICS RECYCLING INTO FUEL BY PYROLYSIS IN AUTOMOTIVE INDUSTRY

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Keywords: Plastics pyrolysis, Plastics distillation, Recycling, Fuel, Automotive industry

Plastics pyrolysis is relatively simple and inexpensive way to recycle residue plastics from different industries into fuels, though it still needs investments and knowledge, therefore it can be a challenging decision especially for smaller companies which are unsure if the amounts of their plastics residue are enough to produce significant amount of fuel and pay off the investments. There are thousands of different plastics and the final end product of pyrolysis and the amount of it differs according to key parameters of process and plastics type used, thus making calculations complicated. This study presents a model of simple tool for profitability calculations of plastics waste recycling into fuel by pyrolysis in automotive industry by narrowing down most common plastics used in this specific industry and optimal key parameters of pyrolysis process to make decision making process easier.

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WEB BASED FAST AND RELIABLE TEXT CLASSIFICATION TOOL

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Keywords: Text analysis, Machine learning, Deep learning, Text classification, Social media analytics

Opinion analysis in big data analysis context has been a hot topic in science and business world recently. Social media has become key data source for opinions generating large amount of data every day providing content for further analysis.

In Big data age unstructured data classification is one of the key tools for fast and reliable content analysis. I expect significant growth in demand of content classification services in the nearest future.

There are many online text classification tools available providing limited functionality. Such as automated text classification in predefined categories and sentiment analysis based on pre-trained machine learning algorithm. The limited functionality does not provide tools such as data mining support and/or machine learning algorithm training interface.

There are limited number of tools available providing whole set of tools required for text classification i.e. this includes all the steps starting from data mining till building machine learning algorithm and applying it to data stream from social network source. My goal is to create a tool able to generate classified text stream directly from social media with user friendly set-up interface.

Methods and materials

The text classification tool has core based modular structure (each module providing certain functionality) so the system can be scaled in terms of technology and functionality.

The tool is built on open source libraries and programming languages running on Linux OS based server. It is based on frontend and backend layers and data storage as described below:

- backend: Python and Nodejs programming language with machine learning and text filtering libraries: TensorFlow, and Keras,
- for data storage Mysql 5.7/8,
- frontend is based on web technologies built using PHP and Javascript.

Expected results

Expected result of my work is a web based text classification tool for opinion analysis using data streams from social media. The tool will provide user friendly interface for data collection, algorithm selection, machine learning algorithm setup and training.

Multiple text classification algorithms will be available as listed below:

- Linear SVM
- Random Forest
- Multinomial Naive Bayes
- Bernoulli Naive Bayes
- Ridge Regressio
- Perceptron
- Passive Aggressive Classifier
- Deep machine learning algorithm.

System users will be able to identify the most effective algorithm for their text classification task and compare them based on their accuracy.

Architecture of the text classification tool is based on frontend interface and backend services. The frontend interface provides all the tools the system user will be interacting with the system. This includes setting up data collection streams from multiple social networks and allocating them to pre-specified channels based on keywords.

Data from each channel can be classified and assigned to a pre-defined cluster. The tool provides training interface for machine learning algorithms.

This text classification tool is currently in active development for a client with planned testing and implementation in April, May 2019.

ANALYSIS OF E-LEARNING ENVIRONMENT FOR GEOGRAPHY: OPPORTUNITIES FOR PERSONALIZED ACTIVE LEARNING

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Keywords: E-learning, Personalized active learning, Geography, Geospatial technologies, Mapker

The rapid changes in technologies for representing learning content impact the modern concept of e-learning. They enable the implementation of personalized learning, development of a friendly, flexible and simulation-based learning environment. In this paper, the e-learning environment for Geography was analyzed. In order to implement personalized active learning in Geography teaching and learning, the requirements of an adaptive tool for Geography teaching and learning are discussed and the theoretical framework for personalized e-learning environment is proposed. Based on previous experimental pedagogical research (carried out in Slovakia between 2008–2013 within the national project "Modernisation of the Educational Process in Elementary and Secondary Schools"), a new geospatial technological approach and theoretical framework for active learning process is discussed, and the prototype of a new Mapker for Geography teaching and learning is presented.

ON POSSIBLE INNOVATIONS AND CREATIVITY IN THE ART OF PROBLEM POSING

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Keywords: Math competitions' problems, Problem posing, Creative problem solving

The art of problem posing, as well as problem solving, even when dealing with a simple and accessible arithmetical problem is often meant to be as dry and precise as possible. Written that way, there are no names in the text, no intrigues in the solutions, every sentence is as short, as precise and as abstract as possible. These extreme qualities are very precious for every mathematician and for any skilled problem solver as well. But the world does not consist only from those kind of people – in fact, there many more types that might be interested in these matters – and we would like to involve quite a few of them in the process of problem solving. One of the possible ways to attract the youth, for instance, is to successfully demonstrate how nicely and invitingly a challenging problem might be posed. In this undertaking a lot if not all of the methods of arts and the popular culture can be applied. Many kinds of art are based on human imagination, which is such a powerful tool of creativity. In this paper a few uncomplicated, yet non-standard formulations of problems are presented, as well as comments concerning possible solutions. Most of these adoptions were made by the author. Many problems were presented in Lithuanian mathematical contests; others were used while working with the students from high school and even from university. Some of the problems discussed here were published in the books written by the author, such as “What to do when you do not know what to do”, Parts I and 11 as well as from the other 3 booklets “Once upon a time a saw the puzzle”, which was kindly published in Latvia some 10 years ago.

STUDY OF CONVERGENCE IN METAHEURISTICS ALGORITHMS

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Keywords: Artificial intelligence, Metaheuristics, Simulated annealing algorithm

Artificial intelligence (AI) system purpose is to help humans solve problems. This science branch for this fiction started in sixth ten. Since then, it has gained momentum and scale. This area is currently associated with a large number of methodologies, some of which are called metaheuristics algorithms.

In this work, we will look at several metaheuristics algorithms. Comparison of algorithm solutions will be performed. We compare the accuracy of the results, the speed of the solution and other parameters. They will solve one of the classic NP problems. This problem is named a scheduling problem.

At all times, mankind was one of the most sensitive problems to plan resources in time. This problem comes from schools to the construction site manager. It also should be mentioned that the computer needs to plan the distribution of resources among the computer components. This paper presents an approach for enhancement of this balance in single solution metaheuristics applied to solve two processors scheduling problem generated during metaheuristic search. We compare each other well-known metaheuristics like Simulated Annealing (SA), genetic algorithm (GA) and artificial ant colonies algorithm.

FORMATION OF THE CREATIVE EXPERIENCE OF STUDENTS IN THE FIELD OF ART EDUCATION

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Keywords: Art education, Art Project, Creativity, Formation, Student

The twenty first century brings new demands to education and is defined by several characteristics of the time: globalization processes, internationalization, abundance of information, rapid development of technologies, ecological crisis. Modern Latvian art space is being filled with art fragments and connections to new, unknown, multiform cultures that differ from the other culture environment. Creative approach towards oneself, peers and surrounding environment helps everyone to mobilize for growth and changes. Options of art education are not sufficiently estimated for now. Considering the above mentioned the questions how can art education be implemented more successfully following the tendencies of the time? and how to foster capacity of personal creativity perfecting the quality of the person's life? become topical. The goal of this research is to discover some significant aspects in the praxis of the creative activities for perfection of art education and elaborate conclusions. The theoretical base of this research is formed by summarizing ideas of pedagogues, psychologists and philosophers and concepts of issue-related documents, but the practical research is based on experience gained during the implementation process of the art projects and survey results of participants involved in the art project. Gradual enriching of knowledge and improvement, development of mental and practical skills and formation of new experience in personally important activity is disclosed by organizing and implementing the individual and group art projects. Creative personality is a person of high-level culture, it is free, independent, rich in initiative, socially active, responsible, ethically balanced, harmonically – especially aesthetically, morally and intellectually developed, creatively capable. Positive creative activity transforms, enriches, develops environment in targeted manner, creates new socially important material or intellectual value. Methodologically justified realization of art education can affect: studies, education and students professional growth in new level of quality, and discovers students for creative activity, for self-expression and self-realization

BUILDING SOCIAL AND LOCAL ACCEPTANCE OF ON-SHORE WIND ENERGY

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Keywords: Acceptance, Benefits sharing, Energy community, On-shore wind, Planning

Building acceptance of renewable energy sources (RES) is key for transition to sustainable energy system. The triangular concept of social acceptance (Wüstenhagen et al.,2007) includes socio-political acceptance which refers to the general support for technologies and policies, whereas market acceptance relates to the meso level, involving both consumers and investors and includes also an intra-firm dimension, and, community acceptance refers to the specific acceptance by local stakeholders, in particular local people and local authorities, of RES projects and where developments are going to be placed. This is particularly true for wind energy, as wind turbines in light of their size and technological performance become step-by-step more economically competitive, on the other hand, perceived impact of wind turbines often lead to strong local opposition that causes significant delays or even project deadlocks. Addressing barriers to social acceptance requires the comprehensive integrated efforts and actions across all levels of governance and sectors. These efforts shall not be stereotyped but shall be based on the innovations and creativity in their both content, implementation instruments and implementation style. The particularly last years are marked by wide international research in social acceptance of wind energy. However still range of social acceptance problems should be further studied, particularly in terms of content and efficiency of the measures focused to raise social acceptance.

The WinWind project enhances the socially inclusive and environmentally sound market uptake of wind energy by increasing its social acceptance in the regions with low level of wind energy penetration despite having considerable potentials. Based on the project actual results, we present the main specific barriers and drivers for on-shore wind energy in general and in Latvia in particular and discuss the novel governance mechanisms and good practices to address them. When discussing the solutions for local acceptance, important principles are: fair determination, respect and reviewing of landowners' long term benefit (land lease conditions for wind turbines siting) is widened to the principle that all inhabitants of the municipality/local community should benefit; involvement of local people in

the planning process from the very beginning; public – private initiatives, citizen cooperative as owner, and others. These principles are demonstrated based on the WinWind project findings. Creating the conditions for effective local community and local stakeholders participation in planning process and ownership, participation in energy cooperatives or similar community led-initiatives can provide an innovative viable strategy. Re-casted Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources gives further important push to develop these initiatives.

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THE PROTOTYPE VERSION FOR E-MATERIAL CREATING AND FORMATTING APPLICATION

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Keywords: Application, E-material, E-study, Formatting, Prototype

It is believed, well-formatted e-materials could improve users reading comfort and vision health after screen-work. That can be followed by educational and life quality increase. There is a need for user-centric and adaptive educational e-materials. Users intuitive ask for the more individual approach for screen work what are related to people complain and objective findings.

One of the possible solutions to reach improvement is the e-material formatting application. That can improve the comfort of using e-material in learning and study process and decrease near workload after screen work. Formatting to e-materials should be applied for natural and comfortable perception and in cooperation with visual processes. In addition, they should be helping the learning process and facilitating memorisation. And the goal of user-centric design could be reached by adapting text formatting for individual needs in addition.

E-material formatting recommendations in the application would be based on developed recommendations for user-centric and adaptive educational e-material creation and formatting. Recommendations are based on user habits research, vision conditions, symptoms and refraction changes research from practice.

After analysing several of possible technical solutions for application development XML approach have been chosen as the best MS file formatting methodology. In the development process, a detailed concept of an application has been used.

Already developed first version prototype gives the overview of application work to follow implemented working schemes, relationships between mine edges and they collaboration process with user, material and database. For the possibility to give formatting recommendations, application collect necessary data from user. That is followed by solution finding with a step-by-step recommendation and so-called tree-scheme of users answers and related application respond what gives a recommendation of text formatting and provides it. After user has tried new formatting of e-material, the application provides a short questionnaire of user feedbacks. An application can be described from four sides: developers, e-material formatting users as readers, e-material creators and researchers.

Application prototype is developed on Moodle type platform base but with possible transformation and adaptation for a different environment and wider range of use. As application is developed to give access to the database to researchers it helps in user-habit research and allows keep application up to date to reach application learning process. That is an important part of nowadays user-centric designs for users' satisfaction.

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INNOVATION AND CREATIVITY IN HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT

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Keywords: Higher education, Science responsibility, Sustainability communicatio

Sustainability as a goal and sustainable development as a process is a social responsibility that challenges education as well as politics and business. In the meantime, it has become widely accepted - not least due to the world decade 'Education for Sustainable Development' - that 'Education for Sustainable Development' (ESD) must be integrated into all areas of education. Thus, not only in research, but also in teaching, universities are called upon to consider how aspects of sustainable development can be integrated into the various courses of study offered by universities.

The German Leuphana University Lüneburg recognized this challenge early on and implemented a study model in which all students in the first semester have to deal with questions of sustainable development. The Leuphana Semester at Leuphana University Lüneburg, together with the module "Science and Responsibility" demonstrate how innovative methods of teaching and learning can be combined with the topic of sustainable development and how new forms of university teaching can be introduced. With regard to module content, it has become apparent that, due to the complexity of the field of sustainability, a single discipline alone is unable to provide analyses and solutions. If teaching in higher education is to adequately deal with this complexity, then it is necessary to develop inter- and trans-disciplinary approaches that go beyond a purely specialist orientation.

The 'Science and Responsibility' module, which is inter- and trans-disciplinary in its approach, uses criteria to demonstrate the potential for innovation and creativity it holds. A concrete example illustrates how students, together with representatives of socially relevant groups, can participate in the sustainable development of a city within the framework of this module and thus make a contribution to urban development as a whole.
In comparison with Latvia experience for ESD there are to be seen less activities at the cross-universities space, but there are also certain success cases to be studied at various universities. In relation to Latvia University there could be also mentioned this approach as inter- and trans-disciplinary developments, particularly, in the fields of Environmental governance and

Sustainable development governance and establishing university-municipality partnership projects, based on research-and-development frame approach. Another aspect to be mentioned is Sustainability communication further design and application, based on collaboration communication approach, incl. information, education/training, participation and pro-sustainability behavior developments and into their complementary character.

German-Latvian ESD developments comparison shall give also new light on existing experiences.

RETHINKING RADICAL IMAGINATION: ETHICS OF ARTIFICIAL INTELLIGENCE

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Keywords: Radical Imagination, Artificial Intelligence, Ethics of AIs.

The aim of this paper is to reveal the relation between the power of radical imagination and its impact on ethics of AI. The radical imagination is understood as profoundly dialogic, creative power existing only through collective, critical encounters. One of the main social and ethical challenges for radical imagination is rethinking of existence of ethical AI. The possibility of creating AI raises a host ethical issues. These questions relate both to ensuring that AI do not harm humans and other morally relevant beings, and to the moral status of AI themselves. The paper dealing the main issues: 1. How we might assess whether, and in what circumstances, AIs themselves have moral status? 2. How AIs might differ from humans in certain basic respects relevant to our ethical assessment of them? 3. Is it possible to create AIs more intelligent than human, and ensuring that they use their advanced intelligence for good rather than il? We argue there is a strong parallel between ethical intention of radical imagination and those behind human codes of ethics for various professions: they are used to openly and transparently communicate to the outside world what are the norms and values in a particular profession, and by doing that to earn trust and acceptance from outside. For increasingly intelligent AI, it is vital that not just the humans comply with the code, but the AIs too. For the latter, one literally obtains a code of ethics, embedded in the AI's program. These ethical dimensions require AI designers to act responsibly. A better idea is to incorporate ethical thinking in the design of AI systems, possibly with the use of AI technology itself. Building ethical values into AI requires two things: capacity to acquire ethical values, possibly from humans and knowledge of which human values are important. The article states that AIs with sufficiently advanced mental states, or the right kind of states, will have moral status, and some may count as persons—though perhaps persons very much unlike the sort that exist now, perhaps governed by different rules. And finally, the prospect of AIs with superhuman intelligence and superhuman abilities presents us with the extraordinary challenge of stating an algorithm that outputs superethical behavior. These challenges may seem visionary, but it seems predictable that we will encounter them; and they are not devoid of suggestions for present‐day research directions.

GIVE YOUR CONTENT CONTEXT WITH AI

Bert Moons
Alfresco, Belgium

Keywords: AI, Cloud, Content, Value, Automation

80% of the information in your organisation exists out of content. And the amount of your content will grow exponential. Therefore it's important to give more context to your content. How can we classify content, automate compliancy rules and apply security.

These days there are several AI services who can help to bring more context to your content. Let's explore and see the value they can bring.

CELLULOSE AEROGELS: PRODUCTION, RESEARCH & APPLICATIONS

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Keywords: Cellulose Aerogels, Paper Waste, Sorbent, Oil Spills, Environmentally Friendly

Waste using technologies become more and more relevant with further implementation of circular economy. Paper and other lignocellulose containing waste are a big waste group, whose potential is not fully exploited. Its usage might reduce CO_2 emissions and greenhouse effect at the same time. Cellulose is used in cellulose fiber, films, membranes, hydrogels, composites and aerogels productions. Cellulose aerogels have large surface area, low density, large porosity and high resistance to compression.

The aim of this research is to create technological principles of cellulose aerogel production as well as to evaluate its efficiency in oil spills clean-up from water surface.

Results and Discussions

Cellulose aerogel is generally prepared in three steps: dissolving/dispersing cellulose or cellulose derivatives, forming cellulose gel by the sol–gel process, and drying cellulose gel while basically retaining its 3D porous structure. Three types of aerogels containing 2.5, 5.0 and 7.5 mas. % cellulose was produced using this technology.

Table 1. Results of oil products sorption capacity after aerogels reusing

Cycle	Amount of cellulose, mas. %	Crude oil		Marine Diesel oil		Biodiesel		Average decrease in efficiency, %
		Sorption capacity, $g \cdot g^{-1}$	Decrease in efficiency*, %	Sorption capacity, $g \cdot g^{-1}$	Decrease in efficiency*, %	Sorption capacity, $g \cdot g^{-1}$	Decrease in efficiency*, %	
1	2.5	8.784	-	5.848	-	6.122	-	-
	5.0	9.940	-	9.108	-	7.846	-	-
	7.5	9.964	-	8.995	-	7.921	-	-
10	2.5	5.768	34	4.152	29	4.285	30	31
	5.0	6.974	30	6.376	30	5.649	28	29
	7.5	5.649	43	5.667	37	5.386	32	37

* Decrease in efficiency was calculated from the results of Cycle 1

After conducting the study of the maximum sorption capacity of the produced aerogels, it was found that the best sorption properties were aerogel

with 7.5 mass. % cellulose. Analysing the sorption of different petroleum products, we can see that aerogels are best suited for crude oil recovery. Their sorption capacity was 9.964 g·g-1, while the sorption capacity of MDO and biodiesel was up to 20% lower and reached 8.995 and 7.921 g·g-1 respectively (Table 1).

Using the extrusion method to regenerate aerogels, a decrease in sorption capacity after 10 sorption/regeneration cycles was determined. On average, aerogels lost 33% of their sorption performance. The best sorption properties after regeneration had aerogel with 5 mass. % cellulose.

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VIRTUAL LABORATORY: A TOOL FOR E – LEARNING

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Keywords: Virtual laboratory, E-learning, Simulations

Increasing interest in distance learning and education has brought Universities at a point that they are forced to think differently and find options to make e-learning suitable in different fields. Experimentation and laboratory practices are crucial in the process of learning physics. One of the best ways to do experiments in physics is using virtual laboratory. Therefore, authors define what lies behind the words virtual laboratory and make some materials for future study courses in local University.

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WATER QUALITY MANAGEMENT WITH IOT IN LARGE INDUSTRIAL TERRITORIES

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Keywords: Scada, IoT, Modbus, Water quality management

In aquaculture, precious resources are mobile and in constant redistribution (e.g., fry, feed). Others remain fixed and are assigned to certain objects. Production is constantly being redeployed. This mobility influences change in the dislocation of resources, which makes the wired or former legacy control and data collection system unsatisfactory with the changed communication conditions. Therefore, it is necessary to use combined, *isolated*, wireless-wired network topologies to connect the data mining and management system, which would work with the *integrated* network or independently.

Taking into account economic growth in recent years, water quality control in industry, agriculture, fisheries and other sectors is becoming a critical issue in terms of water pollution and dwindling resources. Water quality monitoring and distribution has a significant impact to the efficient management of aquaculture resources.

The evaluation of the problems and / or challenges of the fisheries sector, lack of quality control of water resources system as negative factors influencing the continuity of business processes revealed a trend and need to optimize process management by creating a hybrid topology sensor network system for monitoring, distributing and managing the water quality resources in large areas.

In the traditional fish-growing process, the absence of real-time information, there is a practice that complements unnecessary costs and losses, such as planning delays, lost time during manual work (such as search, equipment adjustments, inventory checks), increased risk in security protocol breaches, inefficient equipment, personnel allocation and service planning.

SCADA systems for water quality monitoring has been developed for fish farm. It is intended to improve efficiency of management control of natural resources. It uses genuine Modbus TCP transmitters and converted RS-232/485 signals to Modbus on top of the TCP/IP stack for maximum compatibility between different communication protocols and technologies.

The main goal was to both realize a hybrid PtP (WLAN and LAN) common industrial protocol network topology (CIP), and use a set of objects for Modbus and RS-232/485 or any other communication protocol together with HMI applications based on the SCADA objects to communicate with

the IoT Devices. *SCADA* network efficiency is managed by Inter-VLAN Routing, Trunking.

Gathered water quality parameters will be used in creating mathematical model and predicting effects of temperature, dissolved oxygen in fish ponds as also finding correlation between water quality and fish growth.

CYBERSECURITY COURSES INTEGRATION INTO STUDY PROGRAMME: CHALLENGES AND FUTURE

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Keywords: Cybersecuruty, Education, Learning process, Cisco Networking Academy

Obviously, we are living in a far more technologically-advanced world than we were as recently as a five or ten years ago. And the technological progress continues. The progress, in turn, present a significant challenge to cybersecurity domains. So, the cybersecurity courses are extremely important for educational processes and modern graduates must have security skills in addition to other skills

The interdisciplinary nature of the cybersecurity subjects should be emphasized since they can be implemented in many study programmes such as IT/ICT, electronics, transportation, business management, etc.

The current study intends to research and develop the new model for the integration of cybersecurity courses at the Transport and Telecommunication Institute, and to identify strategies that promote students' learning and success. In particular, we analyzed and concerned the use of Cisco Networking Academy courses. The goal of the empirical study was to find out about students' experience and view on cybersecurity courses. A survey was conducted among the target audience to understand the state-of-the-art and propose integration model related to the cybersecurity courses.

The anticipated points for discussion include the interdisciplinary approach, learning delivery strategies and cybersecurity courses content.

PREDICTING FUTURE, BY USING AI

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Keywords: Artificial intelligence, Deep Learning, Machine Learning, A deep neural network (DNN), Exaflops (a billion billion operations!)

In this presentation, we will often refer to the process of "training" a deep neural network (DNN) and the process of using the trained DNN for "inference". This slide is meant to be a quick primer on the difference between the two.

In the example shown, the job of the DNN is to be able to classify the input picture into one of three different categories – a person, a bicycle, or a strawberry.

Lots of labeled training data is passed in to the network in a "forward pass". With each new piece of training data, the network makes a prediction about what the image is. In the training example shown, the DNN predicts that the bicycle is a strawberry. So it has made an error.

In the "backward pass", the error propagates back through the network and the weights – i.e., the interconnections between the artificial neurons – are updated to account for the error. Once these updates have been made, the next time the same image is passed into the DNN, the DNN will be more likely to predict that it's a bicycle.

When the training process has been completed and the DNN is making predictions with sufficient accuracy, then the model weights are frozen, and the trained model can be used for inference.

The same types of operations that are done for training must also be done for inference. In fact, as we've explained, training involves inference! So you could certainly use a processor designed for training to do inference. However, the use cases of training and inference are not the same, which often implies different processor requirements.

With training, you want to run through a large number of computations on the order of exaflops (a billion billion operations!) as fast as possible, all at once. Training is typically done in a data center, where processor power and physical size are less of a constraint.

Inference, on the other hand, must happen over and over again as the trained model is in use over some extended period of time. There may be strict size or power constraints – for example if the inference is happening in a smartphone or a self-driving car.

So while you could use the same processor for inference as you do for training, sometimes using alternate designs is a more optimal approach for a given use case.

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METHOD ANALYSIS OF SIZE DETERMINATION OF RENEWABLE ENERGY BATTERY

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Keywords: Battery Energy Storage Systems, Li-ion Batteries, Energy Efficiency, Optimization Methods

The rapid development and increasing penetration of renewable generation, such as wind and solar power, and a fast implementation of the electric vehicle are just two trends that can stress the current grid by causing voltage variations larger than it is prepared for. Therefore, it is vital to find and implement economically efficient and sustainable energy storage and conversion systems (Guerra, 2017), (Zeng, 2019), (Dehghani-Sanija, 2019).

In relation to the mentioned difficulties of the operation of the electricity networks and in pursuance of the control of electricity flows between generation and consumption, battery energy storage systems (BESS) are viewed as a viable option in evening out the fluctuations of the net load curve and in conditioning the renewable energy penetration (Chapaloglou, 2019). Lately, the newest electrochemical energy storage devices, e.g. Li-ion batteries, Li-S batteries and supercapacitors, have been recognised as having high potential in energy storage (Gao, 2018).

Energy storage systems must meet various criteria, such as the following: capacity reserve, short-term and long-term energy storage, fast reaction time, geographic independence (mobility or stationary application), energy density assessment, conversion factor, storage expenses, end use (e.g. network connected or separate), environmental impact, and storage terms (Dehghani-Sanija, 2019), (Yang, 2018).

Energy efficiency is the main indicator of the storage systems of battery energy operation, and it is compared among various scenarios. Since connection to networks requires different conversions, high energy losses occur (Shimpe, 2018). Battery is able to store and extract energy in high frequencies, that way ensuring the stability of frequency and voltage, and it is able to do that for a long time, that way ensuring the efficient optimization of the energy control of the renewable energy system (Yang, 2018).

Scientific publications discuss the sizes of the photovoltaic and storage systems. One of the main problems is the optimal battery size determination (Dehghani-Sanija, 2019), (Angenendt, 2019). The placement of battery storage systems based on their sizes may be determined using various methods with each method having its strengths and weaknesses. The

complexity of the methods used also varies to a high extent, applying the methods that range from simple probabilistic methods to mathematical optimization strategies and nature inspired methods (Yang, 2018).

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A BLENDED LEARNING APPROACH FOR TRAINING OF COMPUTING TEACHERS: A CASE STUDY OF LIEPĀJA UNIVERSITY

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Keywords: Blended learning, STEM education, Programming skills, Teacher training

The current paper describes the main results and analysis of the life-long learning courses for in-service Computing teachers in primary school. The curriculum includes (a) introduction to algorithms and programming using visual programming language Scratch, programming language Java, and visual programming language LabView for Lego Mindstroms EV3 robots, (b) IT applications and security, and (c) methodology of teaching of Computing. The learning activities support achievement of goal of the National project *Skola 2030* (School 2030) implemented by Latvian National Centre for Education (VISC): To provide competency-based learning in Latvian schools. The objective of the VISC project is to reduce fragmentation in learning content, to reduce passive learning not related to real-life situations, and to reduce the development of isolated skills. According to the new paradigm, student must be able to transfer knowledge and skills learned in a class to new real-life situations, and collaborating with others to be able to discover answer and construct the solution. In 2018, more than 120 in-service teachers have trained.

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THE COMPUTERIZED ASSESSMENT OF THE PERCEPTION OF VISUAL - MOTOR SKILLS

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Keywords: Computerized assessment, E-study, DTVP-2, Visual-Motor Integration, Visual Perception

Visual- Motor Integration involves effective, efficient communication between the eyes and the hands, so that you are able to copy, draw or write what you see.

The aim of this study was to decide how effective an ImageJ computer program could be and how to apply it to visual perception and visual-motor test results compared with standardized processing method. We test the eye – hand coordination performance of children in standardized DTVP-2 and evaluate the correlation between the quality of stereo vision and performance in eye – hand coordination test. We analyze the DTVP-2 scores using computer program ImageJ. A computerized DTVP -2 test analysis tool helps more precisely get the performance coefficient of eye- hand coordination test.

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KNOWLEDGE MANAGMENT TOOL IN THE LEARNING PROCESSES

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Keywords: Moodle, Blended-learning, Personal knowledge management, Higher education

Moodle (Open Source software package) is one of the most used learning space in the world (230 countries and 94,839 sites are registered (data from Moodle.net, retrieved 11.03.2018.). Moodle is known as a tool for learning management but can it be used for the development of students personal knowledge management skills.

Personal knowledge management got topical by the development of ideas of the knowledge society. Management of knowledge is valuable in three fields – (1) quicker and better decisions – getting familiar with organizations' experience mistakes can be avoided by using adapted solutions un right decisions; (2) wider possibilities – motivating employees to acquire knowledge and use it they become responsible for their investment; (3) speeded up learning – differentiate all new knowledge acquired personally or in learning process in organization.

Students have to manage their knowledge in the learning process, they have to socialize and acquired knowledge must be internalized. In the context of sociocultural theory important condition is before knowledge sharing person need to organize it and make it as own – and this is the beginning stage of socializing.

In Moodle.org discussion board there was a question – can Moodle be considered as a knowledge management solution (https://moodle.org/mod/forum/discuss.php?d=76083, retrieved 11.03.2018) and several answers showed, that it is a solution.

The article will research possibilities of Moodle for personal knowledge management skills support as well as research practice in the higher education institution.

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RECURSIVE DIRICHLET HIDDEN MARKOV MODEL PARAMETER ESTIMATION ALGORITHM

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Keywords: Hidden Markov model, On-line algorithm, Recursive EM algorithm, Dirichlet distribution

Recursive (online) learning is one of the ways for a model to learn from new data without it having to be retrained. It can be applied to many practical problems where the data for training is not available at once. This article addresses a recursive parameter estimation algorithm for a hidden Markov model (HMM). Most of the recursive methods use Gaussian distribution or Gaussian mixtures and do not explore other distributions. The Dirichlet distribution offers high flexibility for modeling data. Thus, this paper focuses on an HMM with multiple states that are assumed to follow from a multivariate Dirichlet distribution. We propose recursive algorithm for HMM parameter estimation based on the Maximum Likelihood method and expectation-maximization (EM) algorithm. The properties of the proposed recursive EM algorithm were explored by a computer simulation solving test examples and demonstrate that this algorithm can be efficiently applied to solve online tasks related to HMM parameter estimation.

TITLE – INNOVATIONS AUDIT OF INDUSTRIAL CLUSTERS: PROCESS AND MAIN TRENDS OF DEVELOPMENT

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Keywords: Industrial clusters, Innovations audit, Efficiency, Development trends

It should be noted that there is no commonly encountered economic approach to analyse the innovations in industry clusters. Various scientists and scientific and political contexts differently identify maritime clusters essence, the importance and stages of cluster development and cluster formation often do not correlate with each other; preconditions, reasons, demand and benefit motives are often treated as synonyms of these concepts; the analysis of preconditions of clustering sector usually is carried out by the evaluation of innovations goals of clusters. This suggests that there is no connectivity and continuity in respect of results of previously published researches. The Innovations audit of the industrial cluster lacks complexity and completeness; lack of a clear methodology for evaluation of concrete clustering sector; scientific works often mistakenly equate sector and cluster and its Innovations evaluation continues in accordance with one selected scientific research method or industry groups of different countries are called clusters and their economic data are further compared. Economic evaluation of Innovation audit in Industrial clusters is a significant research object of this paper.

In this research, it is considered that the Industrial clusters - is the cluster formation process and further development of combined set of integrated companies which operate vertically and / or horizontally in the groups of related industrial economic activities and their tendency to concentrate on the realization of the general activities in Value-added chain by seeking the main economic benefits while dealing with Innovations.

Innovations audit in this paper will be analysed as an assessment of the existing digital level of industrial clusters production and production-related processes (from raw material input to output and service / maintenance / maintenance) to determine whether specific technologies and the totality of production processes correlate with technological developments in the relevant field: processes use up-to-date knowledge of whether processes are effective in evaluating other potential technologies, including manufacturing process equipment with integrated digitization technologies, now and in the future and so on.

While analysing the process of doing Innovations audit of Industrial clusters for the increase of Productivity, Innovations and Competitiveness, this paper analyses the relations of Productivity, Innovations and Competitiveness by outlining main processes and trends of development in field of Innovations audit of Industrial clusters.

USE OF INFORMATION TECHNOLOGIES FOR ROAD POTHOLE DETECTION AND VOLUME CALCULATION

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Keywords: Object, Pothole, Ultrasonic sensor, Volume

Research Problem: There is no system in Latvia to identify road pits and to determine the precise technological mass of hot asphalt concrete, so this paper will examine whether information technology solutions can contribute to the work of a road repairer.

The aim of the research is to develop an algorithm for identification and volume calculation of the road pit.

The paper presents an overview of three existing methods to identify holes as objects. This work uses an ultrasonic sensor to determine the size of a 3D hole. Special attention is paid to its noise classification and possibilities for its reduction. The authors have found a way to organize road surface scanning, convert the resulting data into binary code and calculate the volume of the object. Calculations can be made on both a mobile microcontroller-controlled device and a computer after receiving data. A worker, a self-propelled robot or a drone can be used as a sensor carrier.

Applicability of the Work: The work can be used for further development in the field of transport systems engineering, as well as the task for mechatronics specialists to develop algorithm realization equipment in a real environment.

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