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3rd – 4th December 2024

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Editorial

We are delighted to extend a warm welcome to all participants attending the International Conference 2024 on 3rd – 4th December 2024. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in multidisciplinary fields. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for International Conference 2024 contain the most up-to-date, comprehensive, and globally relevant knowledge across various disciplines. All submitted papers underwent rigorous peer-reviewing by 2-4 expert referees, and the papers included in these proceedings were selected for their quality and relevance to the conference. We are confident that these proceedings will not only provide readers with a broad overview of the latest research results but also serve as a valuable summary and reference for further studies.

We are grateful for the support of many universities and research institutes, whose contributions were vital to the success of this conference. We extend our sincerest gratitude and highest respect to the professors who played an important role in the review process, providing valuable feedback and suggestions to authors to improve their work. We also appreciate the efforts of the technical program committee, reviewers, and authors for their dedication.

Since October 2024, the Organizing Committee has received more than 55 manuscript papers, covering various aspects of multidisciplinary research. After review, approximately 42 papers were selected for inclusion in the proceedings of International Conference 2024.

We thank all participants for their significant contribution to the success of the conference. Our gratitude extends to the keynote speakers, individual speakers, technical program committee, reviewers, and the organizing committee for their efforts in making this conference a reality.

Acknowledgement

The International Conference 2024, was successfully held in 3rd – 4th December 2024. We extend our heartfelt gratitude to our colleagues, staff, professors, reviewers, and members of the organizing committee for their unwavering support in making this conference a success.

We would also like to thank all the participants who traveled far and wide to attend this conference and those who attended the event virtually, making it a truly global event. This conference provided a platform for students, professionals, researchers, and scientists to share their latest research and developments in various disciplines.

The aim of the conference was to promote research and development activities and to encourage scientific information exchange between researchers, developers, professionals, students, and practitioners from all around the world. Once again, we thank everyone who contributed to making this conference a resounding success.

Sukumar Sen
Program Manager
Research Plus

Contents:

Abstract

Quiet Quitting as a New Trend in the Labour Market

Karolina Drela
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Abstract:

Purpose: The purpose of this article is to present the concept of quiet quitting as a new trend in the labour market and HRM, and to identify the risks of this concept on the labour market, including for companies.

Design/methodology/approach: The research methods used in the article include critical analysis of source literature and primary and secondary data analysis.

Findings: The results of the research presented in the article indicate that understanding quiet quitting allows entrepreneurs, managers and organisations to properly manage their human resources. Employees, on the other hand, help to avoid, among other things, job burnout but may jeopardise their careers. However, it has been noted that quiet quitting is disadvantageous for organisations. The article outlines the risk factors and identifies the risk of quiet quitting in today's companies to be very high due to, among other things, the COVID-19 pandemic. It is shown that this new trend in the labour market can be a reason for real employees to leave their jobs.

Research limitations/implications: As the issue under study is broad and multifaceted, the article only discusses the main problems related to quiet quitting.

Originality/value: The issue of quiet quitting presented in the article has not been investigated to date. Exploring selected aspects of 'quiet quitting' may broaden contemporary organisations' understanding of the phenomenon and the problems associated with it.

Keywords:

quiet quitting, organisational development, human capital management, labour market, work engagement.

Supporting Hydrogen Technologies in Regions Based on Smart Specialization Strategies

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Abstract:

To maximize its innovation potential, Europe invests in innovative fields through various support mechanisms. In Poland, in the context of the development of innovation, various solutions are taken into account, including the so-called smart specialization (Smart Specialization Strategy). Identification of smart specializations at the regional level through the identification of technologies and innovative solutions increasingly concerns energy policy priorities. However, in Poland, unlike other European countries, there is a visible gap with respect to hydrogen technologies. The implementation of FCH technologies should be supported by regions interested in innovation because these technologies are or are currently becoming priorities of EU energy policies. Moreover, FCH technologies are innovative, which makes them perfectly fit into the concept of smart specialization proposed by Prof. Dominique Foraya, and which seems to be the basis for more important European innovation support initiatives in recent years. The paper presents an analysis of survey results based on the NCA method, a composite non-compensatory indicator. The use of the NCA method in the study allowed for obtaining deeper insight into the efficiency structure of the surveyed units and detecting key areas requiring improvement.

Building Smarter Europe in the Context of the Global Economy

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Abstract:

Switzerland, Sweden, the United States, the United Kingdom and Singapore are the world's most innovative economies in 2023, according to WIPO's Global Innovation Index (GII). Dicken (2007) points out that Europe is losing the competition for global markets not only to the United States and Japan. In the last two decades, East Asian countries such as China and India have joined the most competitive economies in the world.

The article focuses on the topic of countries' innovativeness in the global economy. In particular, the focus was on the potential of EU countries. The aim of the research was to assess the activities of EU bodies in improving the innovativeness of its member countries in terms of comparison to other economies in the global economy.

The research methods used include analysis of the literature on the subject in the field of innovation, economic development and European Union policy. The research used public data such as WIPO's Global Innovation Index and data from the European Commission. The deduction method was additionally used for reasoning. The research results were presented using graphical methods.

The limitation of the research was the fact that the topic is very broad and only selected topics were discussed for the purposes of the article. The research results complement the knowledge in the field of the research subject and may be useful for formulating future strategies to support the development of innovation at the level of individual countries or the EU.

Using the Made to Stick Framework for Analyzing Media Appearances of Crown Prince Mohammed bin Salman

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Abstract:

This study examines the television interviews of Crown Prince Mohammed bin Salman (MBS) under the communication principles stipulated by Made to Stick by Chip and Dan Heath. The research investigates questions of how MBS successfully speaks to both domestic and international audiences with Vision 2030 reforms and leadership goals. The analysis is based on six key principles: Simplicity, Unexpectedness, Concreteness, Credibility, Emotion and Stories. The principles also explain just why his public pronouncements have been so potent and lasting.

This article employs a qualitative content analysis to various public appearances of MBS, including an interview on 60 Minutes and keynote address at Davos in the Desert, FOX news and Discovery. The results show that MBS event structure hinges on simplifying policy, under the form of complexity reduction of particular legislation, taking novel actions to capture attention and telling enthusiastic stories for youth hope and national pride. His speeches are generally replete with statistical evidence of progress in the land, but this data would be sprinkled with personal and national stories to make his vision more tangible.

Moreover, the research applies Rhetorical Theory by employing Aristotle's persuasiveness strategies (ethos, pathos, logos) to scrutinize how MBS credibilizes (ethos), appeals to audiences' emotions (pathos), and advances reasonable arguments in his speeches. The Framing Theory is also applied to understand how The MBS reforms and his foreign diplomacy are framed by MBS-led Coalition, constructing popular regional as well as global opinion.

Investigation of SNP Variations in Twins for Forensic Applications

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Abstract:

Personal identification based on STR analysis has been routinely worked in forensic investigation worldwide. However, in case of monozygotic twins where they both share the same genetic profile, individual identification cannot be achieved. Recently, the SNP variations for monozygotic twin identification has been reported using next generation sequencing. Nevertheless, this method requires expertise. Hence, this study aims to investigate the SNP variations in monozygotic twins by using SNP typing kit for human identification. Biological samples including blood, buccal cells and hairs were collected from twelve pairs of monozygotic and dizygotic twins from volunteers in northeastern of Thailand. DNA was extracted from the samples and subsequently analyzed for the genotypes of 44 SNPs using iPLEX® Pro Sample ID Panel. From these data, the forensic parameters including the percentage call rate from analyze samples, genotype profiling, match probability and allele frequency across different SNPs were investigated. The results indicated that biological sample from one pair of monozygotic twins exhibited differences in genotype profiles in both of blood and hair. Similarly, in one pair of dizygotic twins, genotype profiles showed differences in buccal cells and hair.

Keywords:

SNP marker; Personal identification; Forensic DNA analysis; Monozygotic twin.

Sustainable Bee Nutrition: Utilizing Brewer's Yeast as an Alternative to Natural Pollen

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Abstract:

The decline in natural food sources for bees, exacerbated by climate change and habitat loss, poses significant challenges to beekeeping and agricultural sustainability. This study investigates the development of a food substitute for bees using brewer's yeast (Saccharomyces cerevisiae) as an alternative to natural pollen. Brewer's yeast, which is rich in proteins, vitamins, and essential nutrients, provides a viable nutritional solution during periods of food scarcity, thereby promoting colony health and productivity. This research focuses on Apis mellifera L., testing various formulations of artificial pollen to evaluate their effects on bee colony growth, immune resilience, and honey production efficiency. The study employs a controlled experimental design across 20 beehives, assessing overall health, brood development, and honey output under different yeast conditions. The results are expected to offer insights into sustainable beekeeping practices, reduce bee mortality, and enhance honey yields, thus supporting the agricultural industry's pollination needs. Total protein content was measured, revealing that the devoid diet contained 25.171 ± 0.071 ug/□L (n=10), while the diet with brewer's yeast contained 107.391 ± 0.745 ug/□L (n=10). Additionally, this research explores brewer's yeast as a cost-effective, accessible, and environmentally sustainable alternative, which may play a pivotal role in enhancing bee nutrition and productivity.

Keywords:

Brewer's Yeast; Artificial Diet; Sustainable Beekeeping.

Modeling and Simulation of a Variable Speed Wind Turbine Based on a Squirrel Cage Induction Generator

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Abstract:

This work studies a wind energy production system composed of a squirrel cage induction machine (SCIG) driven by a variable speed turbine. This machine is controlled by stator quantities through two converters. The grid-side converter will control the DC bus and improve the grid-side power factor; the statorside converter will control the energy flux generated by the stator during the operation of this system. The wind speed is modeled deterministically as a Fourier series representation, which presents it as a superposition of several harmonics. The MPPT control strategy is used to control the electromagnetic torque to adjust the mechanical speed to maximize the generated electrical power. MATLAB Simulink software is used to develop various blocks for the direct vector control of a variable speed squirrel cage induction generator and DC bus control.

Keywords:

Wind energy - Turbine - SCIG - Converters - Modeling - Vector Control.

Identification of Novel Argonaute Proteins Using a Metagenomic Mining Approach

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Abstract:

Synthetic biology combines biology, engineering, and computer sciences to design novel biological molecules and systems tailored for specific purposes. One of its most promising tools is gene editing, which enables precise modifications to an organism's genetic code. On the other hand, using metagenomics serves as a powerful tool that unlocks the broad genetic potential found in uncultured microbial communities. Exploring the untapped genetic diversity of uncultured microbial communities helps identify novel functional proteins with properties and makes best use of the potential of diverse microbial ecosystems.

We developed and employed a metagenomic-based approach to mine for prokaryotic argonaute proteins (pAGOs), an potential gene editing machinery encoded in bacterial and archaeal genomes. Our workflow involved strict quality control, sequence assembly, gene prediction, taxonomic classification, and annotation. We then followed manual validation to accurately identify key domains such as PIWI, MID, and PAZ. Our methodology allowed for the effective screening and identification of these proteins across metagenomes from 25 different ecosystems, ranging from island sediments to freshwater environments.

We analyzed 1,011 publicly available metagenomic datasets from which we identified 1,451 new putative pAGOs across these diverse environments by constructing a custom Hidden Markov Model (HMM) profile, highlighting their significance in various microbial ecosystems. A Markov clustering (MCL)-based approach revealed the presence of four distinct clusters of pAGOs characterized by unique domain architectures and functional specializations. These clusters demonstrate significant variability in the distribution of argonaute proteins across different biomes. Representative proteins from each cluster were further analyzed for their tertiary structure. Notably, our analysis shows the prevalence of argonaute proteins in environments with high microbial diversity and complex defense mechanisms, suggesting a critical role in microbial immunity.

Our work highlights the power of metagenomics to discover novel functional proteins. The findings contribute to a deeper understanding of RNA interference pathways and present promising applications for precise gene editing. Additionally, the study improves our knowledge of microbial gene regulation mechanisms and serves as a potential nucleus for various biotechnological applications, including therapeutics and diagnostics.

Keywords:

metagenomics, argonaute proteins, genetic editing, gene silencing, bioinformatics.

An Efficient Robotic-Assisted Rehabilitation Protocol for Post-Total Knee Arthroplasty

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Abstract:

Many studies have been carried out to examine the impact of prompt and effective rehabilitation treatments after surgery due to the recent rise in demand for total joint arthroplasty. The concept of utilizing robotic-assisted physiotherapy is interesting because of the development of exoskeletons and technologies for human-robot interfaces. This study aims to develop an exoskeletal robotic system for providing efficient rehabilitation program for patients in the initial phases following knee arthroplasty. The robotic system's mechanical structure was anthropometrically designed to ensure the exoskeleton functions solely as a torque source in an impedance control scheme. A systematic review of different interventions in the literature helped identify an effective physiotherapy protocol to strengthen quadriceps, hamstring, and calf muscles, increase knee flexibility, and enhance walking and stair-climbing abilities. A study was conducted on 20 participants (60% female, 40% male) to test out the suggested robot-assisted therapy, showing notable enhancements in pain levels, daily task capabilities, and knee function scores based on the WOMAC index.

Keywords:

rehabilitation, knee exoskeleton, total knee arthroplasty, physiotherapy, clinical investigation.

Familiarity, Attitudes and Ethical Concerns of Romanians Towards Targeted Drug Delivery Therapies Based on Wireless-Guided Nanocarriers. Research Based on ANGIE Project

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Abstract:

Unlike classical medicine, nanotechnology in clinical settings can significantly improve the possibilities of medical intervention. The ANGIE project is focused on developing Targeted Drug Delivery Therapies Based on Wireless-guided Nanocarriers to be implemented in cases where the classical medical therapies – surgeries and medications – cannot be used successfully or may cause other health risks: in oncology, in case of strokes, and neurology. However, due to the complexity and transdisciplinarity required in approaching the clinical implementation of the mentioned nanotherapies and the uncertainties related to their medical use, their marketing release may encounter numerous ethical issues, controversies, and population resistance. Therefore, the analysis of the ethical implications and the public understanding, perception, and attitude is the first stage for improving the acceptability of these therapies. In the first part of our study, we will analyse the main ethical issues debated in the literature regarding the clinical use of wireless-based targeted drug delivery therapies, also trying to catch a glimpse of what the literature may mention about the population's familiarity, perception and attitude towards the development of this new medical branch: nanomedicine. Furthermore, we will briefly expose the responses and tendencies of the participants in the study conducted at the Cardiology I Clinic, Cluj-Napoca, between April and June 2024, regarding the future extensive clinical implementation of the therapies based on wireless targeted drug delivery. The impact of the poor knowledge and understanding of possibilities offered by nanotherapies, uncertainties in the field, and the lack of ethical guidelines in this specific medical field could be observed through a mixed-method analysis of the participants' responses. In the discussion section, we will explore the hypothesis evidenced by the data correlation regarding the participants' familiarity and perception of nanotechnology with their attitude regarding science, religion, public figures and authority. Moreover, we'll have a better understanding of their tendencies by considering their ethical concerns regarding wireless targeted drug delivery therapies and the attitudes towards public campaigns for COVID-19 vaccination in Romania, compared with statistical data at the European level.

Keywords:

wireless targeted drug delivery therapy, nanoethics, survey, patient perception, Romania.

In Vitro Anti-tumor Activities of Novel EGFR/VEGFR-2 Inhibitors: A Personalized Approach to Treatment of Cancer

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Abstract:

Cancer is the world's second-leading cause of death, and despite great breakthroughs in cancer treatment, drug resistance is still a major issue. Targeted cancer therapies have been approved for the treatment of specific cancers such as breast, lung, colorectal, and pancreatic cancers. These cytotoxic drugs inhibit cancer cell proliferation by interfering with certain biological targets involved in tumor growth and progression. As a result, they mitigate the negative side effects of other traditional non-selective chemotherapies. Receptor Tyrosine Kinases (RTKs), such as EGFR and VEGFR-2, are essential enzyme-coupled receptors that transmit cellular signals upstream of pathways that promote cell survival and proliferation. Chemotherapeutics that target EGFR and VEGFR-2, which are both upregulated in solid tumors, show promise as anti-tumor drugs. Aberrantly regulated RTKs have a role in various types of cancer, and greater understanding of kinase dysfunction in cancer is leading to the development of small organic compounds for targeted cancer treatment. Our research focuses on the development of new biomolecules that target the receptors identified through molecular docking studies. The docking results are validated in vitro, and the mechanism(s) by which these novel drugs cause apoptosis and cell cycle arrest are investigated utilizing cytotoxicity, qRT-PCR, immunoblotting, flow cytometry, and enzyme inhibition assays. Several biomolecules with significant anti-tumor activity targeting either EGFR or VEGFR-2 have been successfully produced.

Simulation of Convection in a Ventilated Square a Cavity with Periodic Heating Condition Using the Lattice Boltzmann Method with Multiple Relaxation Times (LBM-MRT)

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Abstract:

In this work, a laminar fluid flow and convective heat transfer, based on the lattice Boltzmann method with multiple relaxation times (LBM-MRT), was simulated. The D2Q9 and D2Q5 models were implemented for the velocity and temperature fields respectively, to solve the momentum and energy conservation equations. The physical model used is a two-dimensional ventilated square cavity with a periodic thermal condition, the left wall is heated with sinusoidal time-dependent temperature, the right wall is fixed at a cold temperature, the other walls are kept adiabatic. The cavity is ventilated by two diagonally opposite openings, the ventilating fluid is air (Pr=0.71). The hydrodynamics of the air flow and heat transfer were controlled with the amplitude of the periodic temperature condition, the Richardson number and the Reynolds number with the respective variation ranges: amp =0 and 0.4, $0.005 \leq Ri \leq 6.$, and Re=100 and 400. The results obtained in terms of streamlines, isotherms and the heat transfer rate, expressed by the average Nusselt number, presented as a function of time and for a settling period, show the significant effect of these different parameters on the flow and thermal structure fields and the transfer rate. A comparison with the case of the constant hot temperature condition was made to quantify the difference in the transfer rate. between the two cases. The results reveal that the magnitude of temperature warming represents a significant effect factor that minimizes the cooling demand and gives a remarkable improvement over the differential heating of vertical walls of a displacement ventilated square cavity.

Keywords:

LBM-MRT, Periodic heating, Ventilated cavity, thermal comfort.

Characterization of Carbonaceous Aerosol at ChAMBRe

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Abstract:

In polluted atmospheres containing fine particulate matter (PM2.5), carbonaceous aerosols commonly constitute a significant and often predominant proportion. The term "carbonaceous" encompasses black carbon (BC), elemental carbon (EC), organic carbon/matter (OC/OM). Black carbon is the most important anthropogenic aerosol influencing the climate change. The influence of carbonaceous aerosol on air quality, visibility, cloud formation and characteristics, planetary radiation balance, and public health are all directly impacted by their tremendous diversity [1, 2]. For this purpose, we developed a multi-step experimental procedure to explore optical studies within controlled atmospheric conditions at ChAMBRe (Chamber for Aerosol Modeling and Bio-aerosol Research).

The developed experimental setup involves ChAMBRe for producing and sampling different aerosols, mainly black and brown carbon [3], a Dekati® eDiluter™ Pro for precise control and adjustment of aerosol concentrations to improve the accuracy of measurements [4], Total Carbon Analyzer (TCA08), Aethalometer (AE33), Nephelometer (Aurora 4000), Photoacoustic Extinction meter (PAXs), Organic Carbon/Elemental Carbon (OC/EC) thermo-optical Analyzers, Multi-Wavelength Absorbance Analyzer (MWAA) and BLAnCA (Broadband Light Analyzer of Complex Aerosol).

At ICESCS-24 we'll discuss the status of the project addressing the effectiveness of combining online and offline techniques for a comprehensive optical analysis of carbonaceous aerosols and their implications for environmental and public health policies.

Keywords:

Atmospheric simulation chamber, Carbonaceous aerosols, Optical properties.

Effective Lipid Recovery from Coelastrella Sp. and Haematococcus Sp. Microalgae Using Low-Cost Protic Ionic Liquids

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Abstract:

The depletion of fossil fuel resources in the world necessitates the consolidation of efforts to explore potential sources of renewable energy such as biofuels. The lipids found in various microalgae species are recognized as one of the promising storages of triacyl-glycerides precursors essential to generate biofuels. Ionic liquids have been frequently promoted as one of the greenest and most efficient solvents used to disrupt algae cells to extract lipids. However, the expensive and complex preparation process of classical aprotic ionic liquids prohibited their practical implementation in real-life applications. Protic ionic liquids are a recently popularized class of ionic liquids, characterized by their low cost and simple preparation process. In this project, we explored the use of protic ionic liquids with methanol cosolvent for the extraction of lipids from Haematococcus sp. and Coelastrella sp. microalgal biomass. Both microalgae species were first characterized for their analytical lipid, protein, carbohydrate, and ash contents before the extraction experiments. The screening experiments of four ionic liquids were performed, and the results showed that [DMBA][HSO4] exhibited the highest extraction performance of lipids from Coelastrella sp. The walls of Coelastrella sp. have shown less resistance to getting penetrated and releasing their lipid content compared to Haematococcus sp. Process parameters such as the temperature, time, ionic liquid to methanol ratio, ionic liquid water content, and ionic liquid acid-to-base ratio possessed a key impact on the lipid extraction potential. The project findings highlight the potential of protic ionic liquids as a cost-effective and efficient lipid extraction approach for the sustainable production of biofuels.

Sustainable Construction Materials: Potential Use of Pulverised Burnt Clay Bricks as a Partial Replacement of Portland Cement

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Abstract

Portland cement production is recognised as a major contributor to carbon emissions, posing immense pressure on the construction industry to explore alternatives. Concurrently, the need arises to reuse waste materials in construction to address the problem in terms of landfill space limitations, depleting of natural resources, and meeting the growing demand for eco-friendly construction materials. Due to the growing trend of urbanisation, significant amounts of waste burnt clay bricks (BCB) are generated every year from various sources including old building demolitions, factory waste, and construction leftovers. This study explores the potential for reusing waste BCB as a supplementary cementitious material. The influence of varying BCB contents (i.e., 0%, 5%, 10%, 20%, and 30%) on the characteristics of Portland cement will be evaluated. The experimental investigation includes determining the chemical composition of BCB obtained from a landfill near Johannesburg, South Africa. Pulverised BCB that passes through a 75-micron sieve will be interblended with Portland cement and will be utilised in two sets of bench-scale laboratory tests. The first set of tests will focus on assessing the flowability, setting times, and consistency of the blend. In the second set, standard mortar specimens, measuring 40 x 40 x 160 mm, will be manufactured, water cured and tested to determine the flexural and compressive strengths after 7 and 28 days. The outcome is expected to reduce the environmental risk by cutting down on carbon production, cost-effective disposal of waste BCB, and decrease the reliance on natural materials.

Keywords:

Waste Burnt Clay Bricks, Portland cement, Ground Clay Bricks, Chemical Composition of Clay Bricks, and Clay Bricks as SCM.

Design and Optimization of Air Supply System Control Strategy of Full-Power Fuel Cell Vehicle Integrated with Short-Term Power Prediction

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Abstract:

Proton exchange membrane fuel cells (PEMFC) have attracted extensive attention in vehicle applications due to their advantages of zero-emission, high efficiency, and fast filling speed [1]. However, due to load cycling, the performance, lifespan, and durability of full-power fuel cell vehicles (FPFCV) still need to be further improved [2]. Load cycling is more likely to cause degradation of fuel cell materials [3]. Carbon catalyst supports can lead to the loss and degradation of platinum owing to fuel starvation and corrosion at the hydrogen-air interface [4]. The dynamics of the fuel cell system (FCS) are very important due to the hysteresis of the gas supply. Poor dynamic response is more likely to lead to gas insufficient supply, especially on the air supply side. Gas starvation is one of the most serious failure conditions of fuel cells during operation. Therefore, high-precision subsystem control is very important for FPFCV, especially the control of the air supply subsystem.

To improve the dynamic response of the system and prevent system performance degradation, first, the feedforward control is designed to improve the system dynamic in this paper (Fig). Then, the power soft loading strategy based on the loading rate is proposed to avoid air starvation and air compressor surges. Meanwhile, a short-term power prediction-integrated rate strategy (PPS) is investigated. Moreover, the diagonal matrix decoupling strategy based on the above strategy is introduced to achieve decoupling control of air mass flow and pressure.

The results show that the power prediction accuracy is greater than 99% in the 2 s prediction time. It is beneficial to achieve air mass flow and pressure advance control. In UDDS and HWFET conditions, the idling time with PPS can reduced by 15.6% and 7.8%. Note that the idle time and start-stop times can be effectively reduced in PPS in UDDS. Meanwhile, the air mass flow and pressure are decoupled. In terms of total varies (TV), the flow TV of UDDS is effectively reduced from 9.38×10^3 to

2.90×10³, while the flow TV of HWFET is effectively reduced from 1.03×10⁴ to 1.82×10³, indicating that the flow and pressure changes are stable and the control accuracy can be improved. This can provide theoretical guidance for the design of high-precision air systems for FPFCV.

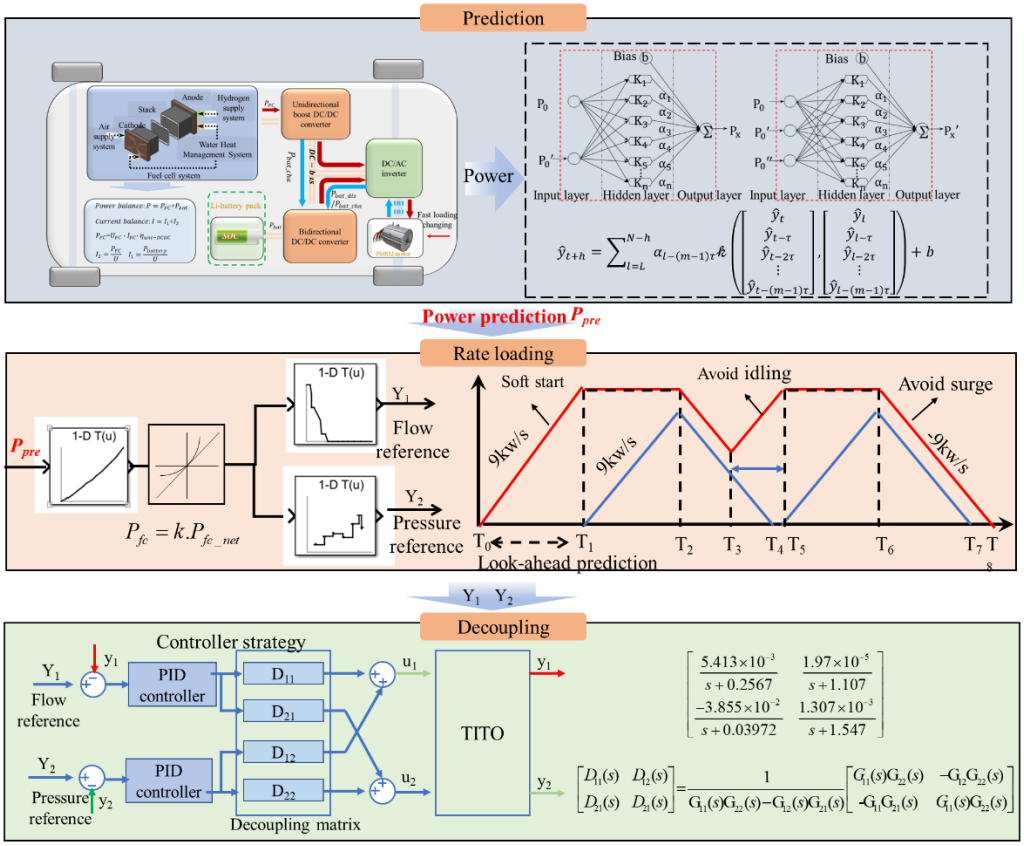

Fig. 1. Power prediction decoupled control design.

From Self-Awareness to Self-Learning: Developing Reflective Competencies of Future Teachers through Simulation Strategies

doc. PaedDr. Renáta Orosová, PhD.,
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Mgr. Soňa Szabó
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Abstract:

The paper explores the development of reflective competencies in future teachers by using simulation strategies as a tool to foster self-awareness and self-directed learning among student teachers, which are crucial for their professional and personal growth. The research aimed to assess the impact of microteaching, as a simulation strategy, on the level of reflective competencies in student teachers. Simulation strategies enable students to recognize their own responses and identify areas for improvement in their approach to learning and teaching practice. The study included 142 students from teacher training programs at Pavol Jozef Šafárik University in Košice and 198 mentor teachers. A custom-designed evaluative questionnaire in the form of a scaled survey, based on autonomous evaluation by student teachers and heteronomous evaluation by mentor teachers, was used to monitor the impact of microteaching as a simulation strategy. The questionnaire's reliability (Cronbach's alpha) was $\alpha=0.803$. In the experimental group, statistically significant differences in reflective competency levels were observed following the implementation of microteaching as a simulation strategy with reflective tools ($p<0.001$). However, in the control group, which engaged in microteaching without reflective tools, no statistically significant difference in reflective competencies was noted. The research findings suggest that simulation strategies not only help future teachers to better understand their strengths and weaknesses but also encourage active personal development, emphasizing the importance of reflective tools. This paper contributes to the discussion on innovative methods in teacher preparation and underscores the need to integrate reflective activities into the educational process.

Measuring Student Teachers' Self-Efficacy to Implement Inclusive Practice: Adaptation of the TEIP Scale and Intergroup Comparisons

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Abstract:

A growing trend in countries with educational policies oriented toward humanistic education is the application of the idea of inclusion in schools, aimed at supporting all students without exception and fully accommodating their needs. This approach is supported, among other factors, by the preparation of future teachers during their undergraduate studies. In addition to developing their professional competencies as inclusive educators, it is essential to monitor how much they trust their ability to influence educational dynamics in response to various instructional situations associated with classroom management. The purpose of this paper is, on the one hand, to adapt the Teacher Efficacy for Inclusive Practices (TEIP) scale (Sharma et al., 2012) for a sample of teaching students at Pavol Jozef Šafárik University in Košice, and on the other hand, to analyze the factors affecting their ability to guide student behavior, collaborate with other educational stakeholders, and implement inclusive teaching practices. The research sample consisted of 141 master's degree students from the Faculty of Arts and the Faculty of Science at UPJŠ (average age AM=23.18; SD=1.33). To validate the research tool, we employed exploratory factor analysis (principal component analysis), as the obtained data did not correspond with the original model, which we tested using confirmatory factor analysis. Both the research instrument and its dimensions demonstrated optimal internal consistency. Considering the selected variables describing the research sample, we identified a statistically significant difference in the efficacy of student teachers in guiding student behavior (field of study), in conducting inclusive teaching (year of study, completed types of pedagogical practice), and in collaboration with other stakeholders of education (passing of the subject/subjects with the issue of inclusive education). Findings suggest that increasing students' self-efficacy in these areas requires attention to their mastery experiences in reflecting on the possibilities of professional preparation, with regard to their specialization in the humanities and sciences.

Keywords:

efficacy, inclusive education, school, student teachers.

Evaluation of the Adsorption Capacity of Dolomite as a Promising Natural Material Suitable for CO2 Capture

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Abstract:

The annual report of the Intergovernmental Panel on Climate Change summarises the direct impact of CO2 emissions on global warming. If warming between 2030 and 2050 will be increased by more than 1.5 °C compared to pre-industrial times, it will result in irreversible changes to the entire planet. Therefore, (according to the IPCC report) CO2 emissions must be reduced by 65 % by 2035 compared to 2019 [1]. Carbon capture is performed with proven technology on well-known materials such as metal-organic frameworks, polymer membranes, amines [2]. However, a more environmentally friendly form are natural materials such as olivine, zeolites or dolomite.

Nowadays, dolomite as a adsorber for carbon capture storage technology is not deeply explored. The presented work aims to investigate the possibility of CO2 adsorption on dolomite. This possibility is demonstrated by a breakthrough curves, measurement of the adsorption capacity of dolomite, measurement of the specific surface area, and analysis of the composition of dolomite by X-Ray Diffraction (XRD). The analyses were carried out for different activation temperatures of dolomite (800 °C, 850 °C, 900 °C) and for different partial pressures of CO2 (10 %, 12 %, 16 % CO2) in mixture with nitrogen. The reusability and sustainability of the adsorber was investigated for nine capture/regeneration cycles.

Activation and regeneration of the catalyst was carried out at three temperatures, while activation at 800 °C being discarded due to the lower specific surface area compared to the other two samples and the release of incomplete amounts of CO2 from the raw dolomite, which was confirmed by XRD analysis. XRD analysis showed minimal difference between dolomite activated at 850 °C and 900 °C. Therefore more environmentally friendly is activation temperature 850 °C. As the number of cycles increased, the sorbent wore out and thus the absorption capacity of the dolomite was lost. Since the experiment was conducted under normal conditions, marginal amount of portlandite after each

regeneration was observed. When all the examined samples were commercial dolomite, they contained iron ions and aluminium ions, so the formation of small amounts of akermanite and gehlenite was also note and their proportion increased with the number of regenerations increased.

The breakthrough curves was measured on 500 g of dolomite with Sensirion STC31-C and Thermogravimetric analyser NETZSCH 449 F3 Jupiter at ambient temperature. Shape of the breakthrough curves are similar for all cycles. This fact shows that the regeneration protocol used was sufficient to remove all previously adsorbed carbon dioxide molecules. Figure 1 shows that the breakthrough time of 36 minutes is longer for the second cycle than for the first and other cycles. The first regeneration caused the breakdown of dolomite, that lead to higher specific surface area. The downtrend of dolomite adsorption capacity from third cycle was due to surface sintering which caused a decrease of specific surface area. The breakthrough time from the fith to the ninth cycle was similar.

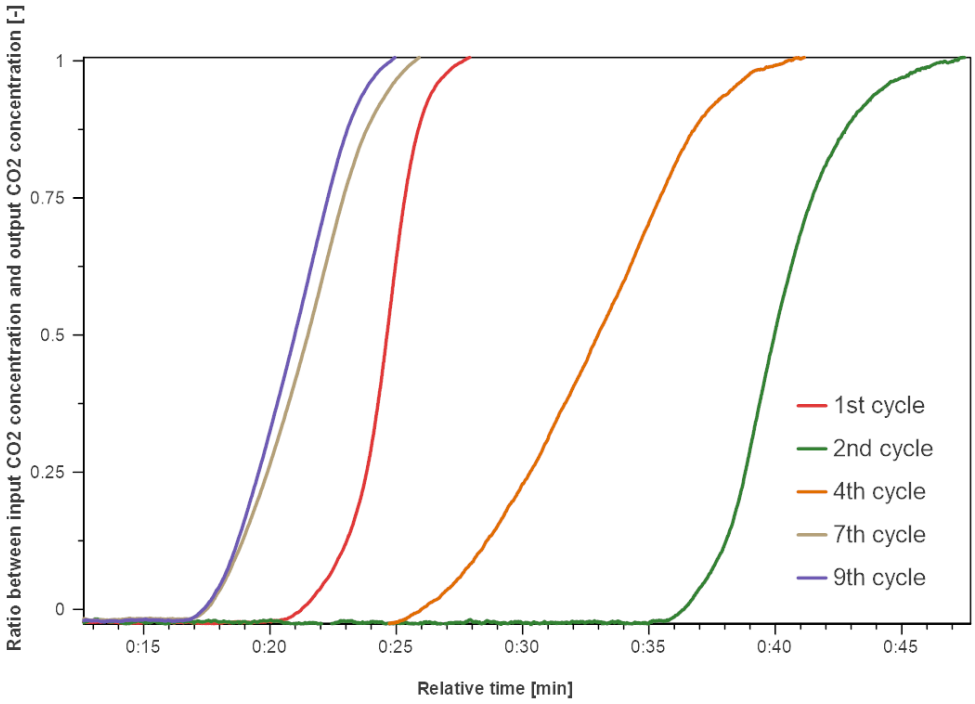

Fig. 1. Carbon dioxide breakthrough curves on dolomite at 1 to 9 cycles, with an inlet carbon dioxide concentration 16 vol. %, at a gas flow rate of 40 ml/min.

Based on these analyses, dolomite appears to be a suitable natural substance for CO2 capture as a cheap and commercially available material with suitable physicochemical properties. Dolomite also showed suitable adsorption properties even after multiple regeneration, indicating potential use in real life applications.

Oman Utilizes Its Soft Power to Mitigate the Impact of Muscat Recent Terrorist Attack

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Abstract:

The Sultanate of Oman was historically known for its diplomacy and as a peace-loving country in the Middle East and North Africa (MENA). It recently faced a new terrorist threat to its national security in Muscat. The main aim of the article is to explore how the country utilized its soft power to mitigate the impact of the Muscat terrorist attack depending on its general diplomacy, cultural diplomacy, and strategic messaging. The qualitative methodology focusing on interviews and analyzing data was utilized to achieve this objective. The result of this article highlights the effectiveness of Oman's soft power strategy in maintaining national security while also recognizing the challenges and limitations that accompany this approach. The aftermath of Muscat's recent terrorist attack proved that a soft power approach is significant in mitigating the impact of the events. The integration of soft and hard power, continued economic diversification, and efforts to address emerging challenges will be crucial for Oman's future security. These findings contribute to a deeper understanding of how soft power can be affected in an unstable region for national security domestically and regionally.

Keywords:

Soft power, Hard power, Smart Power, Public Diplomacy, Cultural Diplomacy, National Security, Terrorism

CRISPR-based Point-of-Care Test Kit for Hand, Foot and Mouth Disease (HFMD)

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Abstract:

Hand, Foot, and Mouth Disease (HFMD) is a highly contagious illness that poses a significant public health concern worldwide. While children under five are most vulnerable, HFMD can also affect older children and adults (Li et al., 2018). The disease is primarily caused by human enteroviruses, with Enterovirus 71 (EV-71) being the most common strain. Current diagnostic methods, including serological and symptomatic diagnosis, are only effective 5-7 days after infection, limiting early detection. To address this, we developed a novel assay targeting the VP1 gene of EV-71 using reverse transcription (RT) combined with recombinase polymerase amplification (RPA), followed by CRISPR-Cas12a detection. Human genomic DNA (gDNA) was spiked into the reaction mixture to simulate clinical samples, and the sample extraction process was also replicated to assess assay reproducibility. Our results demonstrated a sensitivity of detecting as few as 10 copies of viral RNA, even in the presence of human gDNA and simulated sample collection. This rapid and sensitive assay has the potential for point-of-care HFMD detection, offering an improvement in early diagnosis and management.

The use of Morphological Measurement Relationships on Sex Differentiation for Polynemus Melanochir in Cai Rang - Can tho and Long Phu - Soc Trang

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Abstract:

This research examines sex differentiation in Polynemus melanochir through morphometric analyses conducted across two sites in the Mekong Delta: Cai Rang and Long Phu. Over ten months, 520 samples were analyzed for standard length, head length, and body height metrics. Findings indicated that male fish generally maintain positive or stable relationships between total length and body measurements, while females often exhibit negative growth trends. Seasonal and locational effects were also noted, with the wet season favoring growth. These non-invasive morphometric techniques offer a practical approach to sex differentiation, aiding conservation efforts and enhancing understanding of Polynemus melanochir biology in varying environmental contexts.

Keywords:

gender differentiation, Mekong Delta, morphology, Polynemus melanochir.

Morphometrics and Meristics of Tubuca Rhizophorae in Ca Mau and Bac Lieu Provinces, Vietnam

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Abstract:

This study investigates the morphological variations in the claw and walking leg characteristics of Tubuca rhizophorae, a fiddler crab species from the Ocypodidae family, collected from two coastal sites in the Mekong Delta, Vietnam. Monthly samples of T. rhizophorae were taken between December 2023 and September 2024 from Dong Hai, Bac Lieu, and Dam Doi, Ca Mau, with environmental parameters such as temperature, pH, and salinity recorded for each site. Morphological indices, including propodus length, manus length, pollex length, and dactyl length, were measured and analyzed. Results show that while the morphological index did not significantly vary between the two sites or across seasons, significant sex-based differences were observed, with male individuals displaying larger indices than females. Principal Component Analysis (PCA) indicated that temperature and salinity were substantial environmental factors influencing the morphological traits of T. rhizophorae. This research contributes to a deeper understanding of the species' ecological adaptations and morphological plasticity in response to environmental factors in mangrove ecosystems, providing valuable insights into the species' ecological role in the Mekong Delta.

The Association Between Depression and Attitudes Towards Aging Among Old People: A Systematic Review

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Abstract:

Background: The way an older adult perceives himself and other people as they age can have both beneficial and negative effects on their mental health. The purpose of this systematic review was to compile research on the connection between older persons' depression and their views of ageing in order to influence mental health services for this population's practice and policy. Methods: An online search was conducted in four databases for the longitudinal studies for the period from January 2014 to March 2024. We identified quantitative research articles examining perceptions of aging and depression in older adults as well as searches for forward and backward citations. The methodological quality was analyzed. Results: Older adults with a negative attitude towards aging are more likely to have depressive symptoms. Conversely, those with a positive attitude tend to report less depression and more happiness. In addition, perceptions of aging may serve as a moderator in the interaction between depression and health status, hopelessness and personality traits. This suggests that the way people view aging may influence their mental health. Although there is a strong correlation between attitudes towards aging and depression, the exact causal pathway is not clearly defined. It remains uncertain whether negative attitudes lead to more depression or whether depressive states contribute to more negative views of aging. Conclusions: The study has established correlation between depression and aging among old people. The onset of worries that arise in the lives of the population degenerates into the depression outcome. Understanding these relationships could inform strategies for enhancing mental well-being among older adults by promoting positive attitudes towards aging.

Keywords:

Depression, aging, mental health, lethargy and agism.

New Subclasses of Bi-Univalent Functions Defined By (P, Q)-Derivative Operator Subordinate to Lucas-Balancing Polynomials

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Abstract.

Our current study is primarily driven by the abundance of fascinating and productive applications for a broad class of special polynomials. One such special polynomial is the Lucas-balancing polynomials, which have recently been examined in geometric function theory. This paper's main goal is to introduce and study two subclasses of analytic and bi-univalent functions defined by the (p, q)-derivative operator subordinate to Lucas-Balancing polynomials. We obtain the estimates for function coefficients |d2| and |d3| of the newly created classes. We also estimate the Fekete-Szeg¨o problem |d2 −µd2 3 |, µ ∈ R for functions in these classes. We also present a number of findings from our research and draw attention to relevant connections with earlier findings.

Keywords:

Bi-univalent, (p, q)-derivative operator, Subordination, Lucas-Balancing polynomials, Fekete-Szeg¨o functional.

New Results on Differential Subordination and Superordination for Multivalent Functions Involving New Operator

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Abstract:

This research is significant for advancing the theory of analytic and multivalent functions in geometric function theory. It focuses on differential subordination and superordination, which characterize the interactions between analytic functions. To acquire them, we employ the method that relies on the characteristics of differential subordination and superordination. This technique, which is one of the most recent approaches utilized in this domain, allows us to derive several results about differential subordination and superordination for multivalent functions defined by the new operator $\mathcal{M}\lambda$, pm (v, ρ; η) $\mathcal{F}(\xi)$within the open unit disk $\mathfrak{A}$. The differential sandwich outcome is also achieved. Additionally, this work presents crucial exceptional instances that follow the results.

Keywords:

Analytic functions, Differential subordination, Multivalent functions, Superordination.

About Euler Polynomials Coefficient Estimates for Certain Bi-Univalent Functions Defined by Subordinations

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Abstract:

Our research endeavors focus on the introduction of novel subclasses of analytic functions, which are defined in terms of Euler polynomials. The primary objective of our investigation is to estimate the Fekete-Szeg functional problem and determine the Maclaurin coefficients, specifically |c2| and |c3|, for this particular subfamily. Furthermore, we will present a number of innovative findings that arise when we specialize the parameters employed in our core discoveries.

Keywords:

Analytic functions, Euler polynomials, Convolution, Bi-univalent functions, Fekete-Szego problem. 2010 MSC: MSC 30C45, MSC 30C50.

Preparation and Characterization of Sophora Flavescens Extract as Natural Insecticide in Greenhouses

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Abstract:

The role of chemical insecticides in the management of pests is indisputable but the extensive and irrational use of chemicals in agriculture resulted in increasing resistances of the pests and in environmental problems. With the increasing development of pest resistances, it is not easy to achieve satisfactory control effects by using only agrochemical products and therefore, the research try to develop potential pesticide alternatives from bioactive plant natural products, that has received attention in recent years. It has been demonstrated that the principal bioactive constituents of Sophora flavescens are alkaloids which exhibit a wide range of activities, including insecticidal, antiviral and fungicidal effects and a lot of researches are focused on this natural extracts. Also, the polyphenolic extracts can have a potential biological effects. Our direction of the research was optimization of the preparation and characterization of Sophora flavescens root and seeds extract as natural insecticide in greenhouses. The studied pests were the most important insects for a large range of plants: aphids (Hemiptera: Aphididae) and greenhouse whitefly (Trialeurodes vaporariorum). The polyphenolic extracts were prepared and analyzed by UV-Vis spectrophotometric method. The content of polyphenols, total flavonoids and alkaloids was evaluated and antioxidant activity was quantified. The extracts were prepared for optimizing in various conditions established by Minitab 19 software using different ratios of ethanol: water, temperature, contact time and surfactants concentration. The optimal solutions were obtained using OptimClass software that is an interactive system for multi-criteria decision making and evolutionary optimization (http://ecobionet.com/DSS.htm). Our finding indicate that Sophora flavescens extracts in combination with natural surfactant can be considered an environmentally friendly promising tool for greenhouse pests control.

Optimization of Reynoutria Sachalinensis Extracts for Organic Pests Management

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Abstract:

Powdery mildew diseases are widespread in greenhouse and on agricultural crops, and cause a lot of damage to plants, resulting in high economic losses. The easy spread of this disease has always been a problem for farmers and many fungicides have been developed. Frequent applications of these fungicides were used to combat this disease. Many of them were not always friendly to environment, which raised the need of development of a new generation of ecological fungicides. Several studies have been conducted to determine the antifungal activity of plant extracts. Among them, the ethanolic extract of Reynoutria sachalinensis, an Asiatic plant recognised for antifungal properties, showed a good antifungal performance by enhancing the natural defense response of plants. In the present work, the polyphenolic extracts of leaves and stems of Reynoutria sachalinensis were studied as antifungal agents on powdery mildew disease of cucumber and tomatoes. Laboratory tests conducted by UV-Vis spectrophotometric method by using Folin-Ciocâlteu reaction and ethanolic extracts of this plant has yilded a significant content of polyphenols. The antioxidant activity and alkaloids content were analyzed, too. One of our goals consisted of optimization of the extracts preparation. This was done using Minitab 19 software and different ratios of ethanol: water, temperature, contact time and surfactants concentration were tested. The OptimClass software, an interactive system for multi-criteria decision making and evolutionary optimization (http://ecobionet.com/DSS.htm) was used for the interpretation of the results. It was concluded that the addition of surfactant based on fatty acid ethyl esters obtained from natural oils can improve the fungistatic and fungicidal effect of Reynoutria sachalinensis extracts in vineyards and greenhouses.

Keywords:

Reynoutria sachalinensis, extracts, polyphenols, DPPH, optimization.

Integration of RF-SVM Hybrid Machine Learning Model and IoT for Water Demand Prediction and Irrigation Automation: A Systematic Literature Review and Future Research

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Abstract:

The administration of water resources in agriculture is significantly hindered by the increasing global demand for food. Consequently, employing hybrid machine learning-based intelligent systems has emerged as a feasible approach for enhanced accuracy and efficacy in water demand forecasting. This study conducts a Systematic Literature Review (SLR) focussing on the Random Forest (RF) and Support Vector Machine (SVM) algorithms, which are commonly utilised in hybrid models, to examine recent research on the application of hybrid machine learning models in water demand prediction. Relevant materials were identified, evaluated, and analysed through the IEEE Xplore, ScienceDirect, SpringerLink, and Google Scholar databases as part of the systematic literature review procedure. The results indicate that the RF-SVM hybrid technique, when integrated with real-time data from Internet of Things (IoT) devices, enhances the accuracy of water demand prediction relative to a standalone model. Data integration, computational complexity, and restricted model interpretability are persistent challenges. The practical application is further impeded by the diversity of environmental data utilised in these studies and the limitations of extensive testing. The study identified potential areas for further research, including the development of more comprehensible and adaptive hybrid models, as well as the integration of data from several sources to enhance prediction accuracy and robustness. This study is expected to provide recommendations for practitioners and researchers on the optimal utilisation of intelligent systems in sustainable agricultural water management.

Keywords:

Intelligent System, Water Demand, Hybrid Machine Learning, Random Forest, Support Vector Machine, Literature Review

Navigating Technological Disruptions: Strategies for Sustainable Adaptation in the Digital Era

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Abstract:

The study focuses on the changing nature and direction of technology, like AI, blockchain and automation on the economy and growth. Consequently on the constant reshaping of business models that change the nature of work, which change the shape and kinds of skills of the labour force as well, and consequently change the employment, in the present and future. The study will apply an interdisciplinary approach to analyse the new systemic change, the new technology and innovative disruptions and impacts on workforce and on labour markets around the world, the different industries that contribute to economic growth, in the 21st century. The study will also provide the opportunities and the challenges to respond to the technological uncertainty and innovation.

Hydrogen Industry 4.0: A Review on Digital Twin Approaches

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Abstract:

Hydrogen is a clean, versatile energy carrier and is considered one of the most favored ways of transitioning into a more sustainable energy future. However, it faces significant challenges in the industry, especially in production, storage, and distribution, which handicap large-scale deployment. On the other hand, Industry 4.0 is expected to lead to advanced new tools and techniques that can solve most of these challenges, with the most promising solution being the digital twin. Digital twins are real-time virtual representation of actual physical systems and allow realtime monitoring, simulating, and optimizing processes relevant to hydrogen. This review will, therefore, present a compact analysis of digital twins' applicability within the hydrogen industry. Building on a brief review of the role of hydrogen in the energy transition and its associated challenges, and introducing the principles and technologies that underpin digital twins and their application to enhancing the efficiency, safety, and reliability of hydrogen systems, A detailed case study is presented where the implementation of digital twins was performed for a hydrogen production facility. The main aim of this review is to reveal the potential of digital twins in this sector, and bring up the main concerns and shortcomings for future research directions.

Keywords:

Hydrogen production, Digital twin technology, Industry 4.0, Energy transition, Sustainable energy.

Vocalizing Hermit Crab: Using "Viola Sound Safari" for Extended Technique in Sonic Experiments with Refugee Children

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Abstract:

"Vocalizing Hermit Crab" is a groundbreaking sonic experiment utilizing the interactive musical game "Viola Sound Safari" to explore extended viola techniques with refugee children. This project leverages the unique capabilities of the viola to produce diverse timbres and textures, engaging participants in an immersive auditory journey. "Viola Sound Safari" integrates advanced gamification principles, presenting interactive challenges that prompt children to experiment with harmonics, sul ponticello, col legno, and microtonal variations. Including live electronics and real-time sound processing expands the viola's sonic palette, allowing for intricate and innovative soundscapes. This experiment encourages refugee children to manipulate and discover new sounds, transforming their personal experiences into expressive auditory creations. The game's interactive nature facilitates spontaneous and intuitive exploration, fostering a deep connection between the player and the instrument. Preliminary findings suggest that this gamified approach enhances creative experimentation and emotional expression, providing valuable insights into the therapeutic potential of music technology. "Vocalizing Hermit Crab" showcases the intersection of technology, music, and social impact, offering a novel framework for sonic experiments that can be adapted to various contexts and populations.

Keywords:

Extended viola technique, Gamification, Microtonal variation, Refugee Children, Timbre.

Assessing the Influence of Price Perception, Product Quality, and Service Quality on Starbucks Customer Satisfaction in Surabaya

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Abstract:

This study investigates the impact of price perception, product quality, and service quality on customer satisfaction at Starbucks in Surabaya. Amid Indonesia's expanding coffee shop culture, understanding factors that drive satisfaction is crucial for sustaining competitive advantage. Utilizing a quantitative approach, data were collected from 113 Starbucks customers at a prominent Surabaya location through purposive sampling. Multiple linear regression analysis revealed that price perception and product quality significantly enhance customer satisfaction, while service quality showed no notable effect. These findings underscore the importance of aligning product attributes with customer expectations and setting prices perceived as fair to foster loyalty in an increasingly competitive landscape. Future research could expand these insights by exploring additional satisfaction drivers and conducting comparative studies across brands and regions.

Keywords:

Price Perception, Product Quality, Service Quality, Customer Satisfaction, Starbucks.

Does Digital Financial Inclusion Reduce Poverty in Developing Countries? The Role of Service Providers and DFI Dimensions

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Abstract:

Although Digital financial inclusion (DFI) has become the current finance revolution among developing countries (DCs), there is no sufficient theoretical and empirical support about its connection to overall policy objectives, among which is poverty reduction. This study tests whether this revolution is theoretically and empirically supported in DCs using fixed-effect and panel two-stage least squares on a sample of 96 DCs over the years of 2014, 2017 and 2021. This analysis leverages a new index of DFI constructed for 142 countries. The results show that DFI reduces poverty through two key channels: increase in GDP per-capita and increase in service-sector employment. Underscoring the importance of DFI providers, the results show that DFI's effect is higher when the DFI provider is non-bank and vice-versa. The results also show that the effect of DFI on poverty is non-linear, which by extension, is highest in sub-Saharan Africa, followed by South-Asia and the pacific, Latin-America and the Caribbean and finally Central-Asia, North-Africa and Middle-East. While each DFI dimension is important for poverty reduction, digitisation dimension reduces poverty more than other dimensions. These results are robust to alternative measures of poverty and DFI, alternative poverty line and control for financial inclusion and financial development.

Keywords:

Digital Finance, Financial service, Financial Markets

Potential of Lactic Acid Bacteria from Sala Lauak as an Organic Fertilizer Made from Cow Manure and Its Benefit to The Environment

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Abstract:

This research aims to obtain lactic acid bacteria (LAB) species from Sala lauak originating from the city of Pariaman molecularly and to determine the effect of adding LAB on the increase of N, P, and K content in organic fertilizer, as well as to conduct a business feasibility analysis. LAB in sala lauak was identified using the 16S rRNA method. Organic fertilizer was made by adding 3% LAB starter. The parameters observed in this study were the values of N, P, and K. The feasibility analysis was conducted by calculating the B/C ratio. The LAB isolated from Sala lauak from Pariman was Weissella cibaria. This LAB has the potential to be a starter in the production of organic fertilizer. The organic fertilizer with the addition of 3% Weissella cibaria provided the best N, P, and K values with respective values of 2.25%, 1.26%, and 0.56%. In the business feasibility analysis, a B/C ratio of 1.65 was obtained. Those results show that organic fertilizers have good N, P, K values and can replace the use of environmentally unfriendly chemical fertilizers. this research shows that the project to be undertaken is feasible

Keywords:

lactic acid bacteria, weissella cibaria, organic fertilizer, cow manure.

Molecular Identification of Polystyrene-Polycaprolactone Polymers Degrading Bacteria Isolates as a Slow Release Urea Coating

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Abstract:

Research on the molecular identification of potential bacterial isolates to degrade polystyrene-polycaprolactone (PS-PCL) coating polymers as slow-release urea coatings was carried out to see the efficiency of decomposition of slow-release urea fertilizer coating polymers assisted by bacterial microorganisms. The research was conducted using a field survey method and followed by an experimental method. The stages of the research were carried out from taking soil samples in the area of plant roots and isolating bacteria using specific media to obtain bacteria that have the potential to degrade the coating polymer, then testing the weight reduction of the coating polymer film to test the potential ability of the bacteria. Bacteria capable of reducing the weight of the coating polymer film were further tested by SEM observations, FTIR tests and molecular identification using 16s rRNA sequences. The results obtained in this study found PSPC 6 bacterial isolates that had the potential to degrade PCL 6 coating polymers as indicated by the reduction in initial weight of 0.025 grams to 0.01701 grams, observations were carried out for 4 weeks. Furthermore, bacterial 16s rRNA sequences were analyzed through bioinformatics to obtain species phylogenies. The results of 16s rRNA sequence analysis through BLAST analysis and phylogenetic tree construction showed that the bacterial isolate PSPC 6 has similarities to the species Klebsiella aerogenes strain BLPS9 (accession number: ON460268.1).

Keywords:

Coating, Degradation Klebsiella aerogenes strain BLPS9, Polymer, Slowrelease urea

International Academic Partnership in Higher Education: The Foundations of Cross-Cultural Communication as Illustrated through Life Writing

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Abstract:

International academic partnerships have become integral to the advancement of higher education in the globalized world. However, effective cross-cultural communication within these partnerships presents both challenges and opportunities. This paper critically examines the dynamics of cross-cultural communication in international academic collaborations, drawing insights from higher education, communication studies, international relations, sociology, psychology, and technology. Through empirical accounts of the authors' own life writing and real-world examples, the joint representation explores the challenges faced, opportunities afforded, and ongoing strategies for fostering effective communication in diverse global contexts.

Keywords:

cross-cultural communication, international academic partnerships, higher education, educational theory, life writing, intertextuality

Effect of Different Parenting Styles on an Adolescent's Rumination

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Abstract:

My research focuses on the effect of different parenting styles on an adolescent's rumination. Rumination, a pattern of repetitive and passive focus on distress, is a significant factor influencing mental health during adolescence. By examining how authoritarian, authoritative, permissive, and uninvolved parenting styles impact this cognitive process, I aim to gain insights into how parental approaches shape adolescent mental health outcomes.

I am particularly motivated to study this topic due to the critical nature of adolescence as a developmental period, where individuals are highly susceptible to mental health issues. Understanding the influence of parenting can help in developing interventions to support healthier cognitive and emotional development.

The study will involve a sample size of 10 participants, aged 14-17 years. This age group represents a crucial stage where the effects of parenting styles are profoundly observed and can provide valuable data on the intersection of parenting and adolescent mental health.

Beyond Technological Depression: Reimagining Japanese Futurism through Artificial Intelligence

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Abstract:

This project develops AI-driven research methods to transform the media-recycled concepts of architectural imagination, demonstrated through my ongoing experiments on the technological depression of Japanese futurism. The subject addresses contemporary challenges of both Japanese and global imaginaries, where technological advances can no longer transform urban landscapes under the grand narratives of socio-economic stagnation. Relevant cultural biases circulate through the media reproduction of Japanese urban scenes in retro-futuristic concepts of arts and design, which undergoes further development through the data-informed creativity of AI content generation. Alternatively, my project takes AI image generation models as synthetic representation devices to reshape targeted concepts through counter-narratives from captured local scenes. The research leverages progressive text-image generation exercises on Stable Diffusion (SD) to identify significant architectural concepts and media references of Japanese futurism, followed by field research to document architectural and urban scenes with alternative implications. By fine-tuning SD models with curated datasets of captured local concepts, the project visualizes alternative interpretations of Japanese futurism beyond technological depression. The current progress involves data collection and AI training experiments on Kansai urban imaginaries through my participation in the Architect-in-Residence Program at the Space Department Nara. Targeted concepts to synthesize include the Osaka Expo project, sea-front infrastructures in Kobe, and urban-ecological design in Kyoto and Nara. In addition to sharing theoretical frameworks and research methods, my presentation will demonstrate test images of Kansai-inspired futurism from my AI training progress for creative exchanges in shaping further experiments.

Keywords:

Architectural imagination, contemporary visual culture, artificial intelligence, technological depression, Japanese futurism, artistic research

The Application of Neural Networks in the Pedagogical Process of Training Prospective Computer Science Educators

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Abstract:

This article discusses the possibilities of applying neural networks in the training of future teachers of informatics. The methods of teaching artificial intelligence and machine learning methods by introducing neural networks in the educational process are discussed at the Department of Informatics of L. N. Gumilev Eurasian National University. The paper discusses the comparison of face recognition algorithms in the field of neural network construction, learning and computer vision, in particular, Haar cascade classifier and MTCNN algorithm. Methods for dealing with hidden layers, data classification, and improving the efficiency of neural networks are also discussed. These methods will enable future computer science teachers to enhance STEM learning and learn the fundamentals of machine learning.

Keywords:

neural networks, machine learning, computer vision, face recognition, Haar cascade classifier, MTCNN algorithm, STEM education, computer science teacher training, artificial intelligence, deep learning.

Empowering Schools with AI Education: A Pedagogical Framework for Cross-Subject Integration in Grades 7–12

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Abstract:

Artificial Intelligence (AI) is transforming the workforce and reshaping various aspects of life, yet it remains underrepresented in school curricula across Europe. AI education not only requires imparting technical knowledge but also fostering critical thinking, problem-solving, and ethical awareness. This research addresses the gap by developing a pedagogical framework for integrating AI education into secondary schools, spanning multiple subjects and emphasizing real-life problem-solving and cross-disciplinary learning. Pedagogical frameworks provide structured approaches to teaching and learning, shaping curriculum design and instructional methods (Koper et al., 2008; Susanto et al., 2020). In the context of AI education, these frameworks must be dynamic and adaptable to address the rapid developments in AI technology (Subramanian et al., 2023).

Utilizing the Design Science Research Methodology (DSRM) (Peffers et al., 2007; Venable et al., 2016), this research develops a flexible, iterative framework to ensure both theoretical soundness and practical viability in AI education. The research identifies several barriers to integrating AI into education, such as teacher preparedness, resource limitations, and concerns over data privacy. These challenges inform the objectives of the framework: enhancing teacher competencies, promoting cross-subject integration, and ensuring the curriculum includes AI's social implications. Literature reviews (Malicky et al., 2007) have shown the importance of pedagogical models that guide educators in embedding AI into various subjects, while also addressing ethical considerations and data security. Key to the framework's development is its focus on real-life problem-solving and interdisciplinary learning, ensuring that AI education is not confined to computer science but applied across subjects such as mathematics, social studies, and language arts. The SAMR framework (Romrell et al., 2014) and TPACK (Mishra & Koehler, 2006) guide the integration of AI technologies at varying levels of complexity, enabling educators to progressively incorporate AI into their classrooms in meaningful ways. Additionally, experiential and project-based learning approaches are adopted to facilitate student engagement with AI through hands-on, real-world applications (Yue et al., 2022).

This research contributes to the discourse on AI education by proposing a comprehensive, adaptable framework designed to prepare students and teachers for a future in which AI plays a central role. By fostering AI literacy and cross-subject integration, this framework aims to develop students' technical skills alongside critical thinking and ethical awareness, ensuring they are equipped to navigate and influence an AI-driven world.