Proceedings

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THE FIFTH INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING MANAGEMENT AND INFORMATION TECHNOLOGY

September 11-13, 2025, Dubai, UAE

SEMIT 2025

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Proceedings of

The Fifth International Conference on Science, Engineering Management, and Information Technology

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Date: September 11-13, 2025

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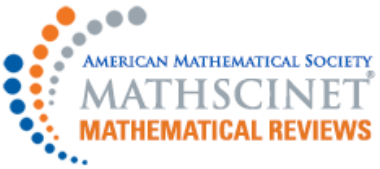

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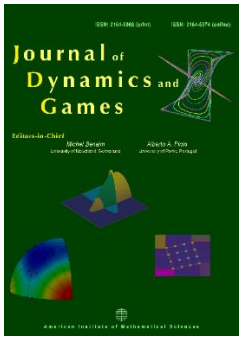

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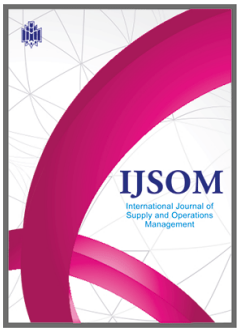

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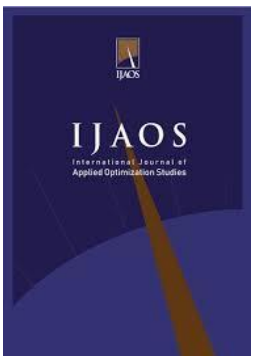

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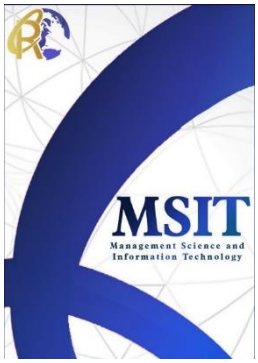

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About SEMIT 2025

The Fifth International Conference on Science, Engineering Management and Information Technology (SEMIT 2025) brought together faculty members, scholars, educators, industry professionals, and students from around the world. The conference was held in hybrid mode (online and in-person) from 11–13 September 2025 in Dubai, UAE, allowing participants to join either physically or virtually. It provided a platform for exchanging knowledge, experience, and the latest scientific and practical advancements in engineering management and information technology, bridhing both academic research and industry practice.

SEMIT 2025 offered an excellent opportunity for experts to respond to address national and international challenges in engineering management and IT issues while promoting collaboration between universities and industry. In addition to paper presentations and invited keynote lectures, the conference featured workshops and other interactive programs, with detailed information available on the official website :https://semit2025.refconf.com/.

The conference welcomed researchers, lecturers, students, managers, and professionals in engineering management and IT. The language of the conference was English, with papers accepted in both English and Turkish. selected English papers were published in Springer's CCIS book series or will be considered for submission to the journals listed on the conference website, all of which are indexed in recognized databases such as Scopus.

With the growing importance of Industrial Engineering and Information Technology, SEMIT 2025 was organized by the Institution of International Scientific Services (RefConf) in cooperation with Ankara Yildirim Beyazit University (AYBÜ). The conference featured numerous papers across 19 specialized panels, complemented by workshops and keynote speeches from prominent professors, attracting participants from multiple countries and fostering international collaboration.

Conference Topics

All submissions falling within the broad area of Science, Engineering Management and Information Technology are welcome. In addition to research papers, case studies would be perfectly welcome. Full papers and abstracts are accepted for presenting in the conference and publishing in the conference proceeding. The conference topics include, but not limited to the following subjects:

- IT and EM-based case studies of manufacturing/ service industries (including automotive, food, agriculture, tourism, petroleum, electronic, civil, healthcare, insurance and banking, energy, etc.)
- Artificial intelligence applications in IT, engineering & management
- Heuristic and Metaheuristic algorithms and applications in engineering & management
- Data science in engineering & management
- Applied soft computing in engineering & management
- Blockchain in engineering & management
- Optimization and decision making in engineering & management
- E-government, E-commerce, E-learning
- Marketing and E-marketing

- Internet of things (IoT)
- Industry 4.0, supply chain 4.0, and logistics 4.0
- Supply chain management (green SCM, sustainable SCM, agile SCM, JIT SCM, global SCM, etc.)
- Inventory control, production planning and scheduling
- Data science in project management
- Quality and productivity management and tools
- Decision support and expert systems
- Digital technologies in service and industry
- Machine learning, deep learning, and neural networks
- Other fields of study related to IT, engineering & management

AYBU Preface

We are honored to present the proceedings of the International Conference on Science, Engineering Management, and Information Technology (SEMIT 2025) to the program's authors and delegates. We hope that it will be a useful, exciting, and inspiring resource for all readers.

SEMIT 2025 aimed to provide a platform for discussion engineering management and information technology concerns, challenges, and possibilities. The rapidly growing scope and evolution of engineering management has resulted in new issues and questions. We feel the papers submitted for SEMIT 2025 provide important tools to address these issues.

The reaction to the request for papers was very positive, with submissions coming from Turkey, Iran, and other countries. We'd like to offer our gratitude and appreciation to all of the reviewers who assisted us in reviving some of our SCI, Scopus and TRdizin papers. We also like to express our gratitude to the members of the organizing team for their efforts.

We wish all of the attendees of the next SEMIT a beautiful and productive conference, as well as our international visitors a pleasant stay in Ankara.

Prof. Ergun Eraslan

Dean of Faculty of Engineering and Natural Sciences, AYBU

Conference Report

Prof. A. Mirzazadeh,

Kharazmi University, Iran
Institution of International Scientific Services

The Institution of International Sceintific Services (RefConf), in collaboration with Ankara Yildirim Beyazit University, successfully organized the Fifth International Conference on Science, Engineering Management and Information Technology (SEMIT 2025). The conference aimed to keep pace with the latest advancements in Industrial Engineering and Information Technology, while also fostering university-industry collaboration and encouraging experts to address current challenges in engineering management and IT.

SEMIT 2025 provided a dynamic platform featuring 19 specialized panels- including a symposium comprising four sessions, scientific and applied lectures delivered by keynote speakers and distinguished professors, as well as interactive workshops that engaged participants from around the world. A key strength of the conference was the scientific support of 21 universities and associations across the USA, Czech Republic, Tunisia, Turkey, Portugal, Poland, Kuwait, Iraq, Ukraine, India, Bangladesh, and Pakistan. The conference was enriched by the presence of nine keynote speakers and workshop organizers from the USA, Czech Republic, Saudi Arabia, the United Arab Emirates, and India. In total, more than 300 authors contributed to the event, highlighting the global appeal and academic rigor of the conference.

From over 300 submissions, 100 high-quality papers were accepted for presentation. Their abstracts are published in this volume, while the full versions will appear in the Springer CCIS (Communications in Computer and Information Science) Book Series, or the conference proceedings and one of the nine associated scientific journals journal, namely: 1) Journal of Dynamics and Games (JDG); 2) International Journal of Supply and Operations Management (IJSOM); 3) Journal of Turkish Operations Management (JTOM); 4) Interdisciplinary Journal of Management Studies (IJMS); 5) International Journal of Applied Optimization Studies (IJAOS); 6) Journal of Optimization and Supply Chain Management (JOSCM); 7) Journal of Management Science and Information Technology (MSIT); 8) Journal of Optimization and Decision Making (JODM); and 9) Researcher.

The conference was further strengthened by the contributions of 84 international technical program committee members representing 29 countries, whose expertise ensured the high quality of accepted papers.

Overall, SEMIT 2025 achieved its mission of providing an effective academic and professional forum for exchanging ideas, addressing contemporary challenges, and promoting collaboration across borders in the fields of science, engineering management, and information technology.

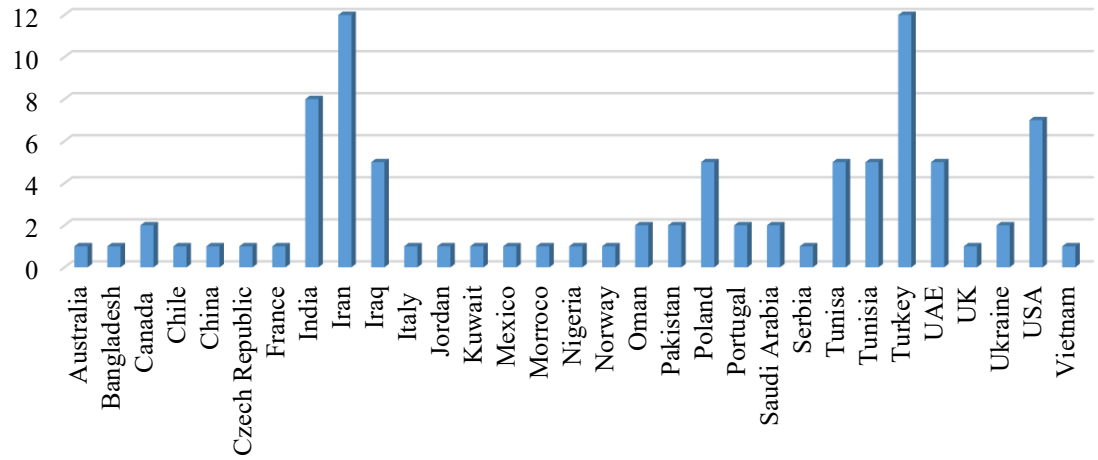

Figure 1. Geographical Diversity of SEMIT 2025 Conference Committees

About 25% of the presented papers originated from Turkey, while the remaining contributions came from a diverse range of other countries worldwide.

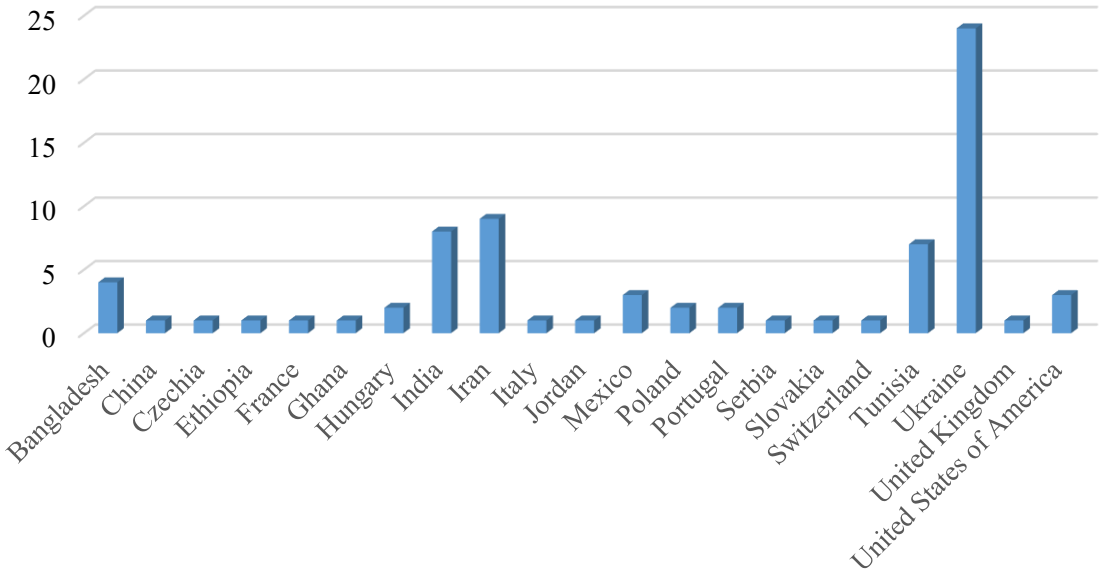

Figure 2. Geographical Distribution of the Papers in SEMIT 2025

Selected English papers from the conference were published in Springer's CCIS book series. Articles published in CCIS are indexed in the following leadingdatabases:

- **Scopus**
- **SCImago**
- **EI-Compendex**
- **DBLP**
- **Google Scholar**
- **Mathematical Reviews**

In addition, CCIS volumes are submitted for possible inclusion in the Web of Science, where they are evaluated by Clarivate Analytics.

We hope that SEMIT 2025 has contributed to advancing knowledgein Engineering Management and Information Technology, as well as in the many multidisciplinary fields related to these two main areas.

Finally, we would like to extend our sincere gratitude to all those who made this event a success. This achievement was made possible through the motivation, dedication, and tireless efforts of our colleagues at Ankara Yildirim Beyazit University and partner universities, along with the valuable contributions of the board members, students, panel chairs, steering committee, technical program committee, reviewers, keynote speakers, workshop organizers, executive team members, panel members, presenters, and attendees.

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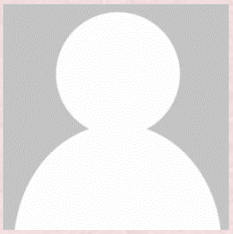

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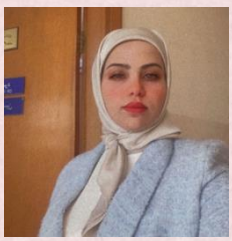

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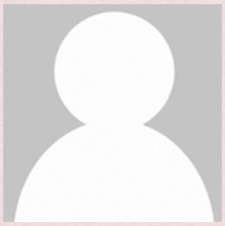
Saint Peter's University, USA

Associate Prof. Md. Safaet Hossain
University of Information Technology and Sciences (UITS), Bangladesh

Dr. G.R. Ramesh Kumar
National University of Science and Technology, Oman



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ISEP- School of Engineering, Portugal

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Şafak Kağar
Ankara Yıldırım Beyazıt University, Turkey

Keynote Speech

Prof. Dursun Delen

Regents Professor at Oklahoma State University,
Stillwater, OK, USA
and Professor at Istinye University, Istanbul, Turkey

Demystifying Data Science: Transformative Real-World Applications Driving Innovation

Short Biography

Dr. Dursun Delen is a world-renowned thought leader in the fields of artificial intelligence, data science, and business analytics. He currently serves as the William S. Spears Endowed Chair in Business Administration and the Patterson Family Endowed Chair in Business Analytics at Oklahoma State University's Spears School of Business, where he is also a Regents Professor of Management Science and Information Systems and the Director of Research for the Center for Health Systems Innovation. Before joining OSU, Dr. Delen spent five years as a research scientist at a private research and consultancy company where he led groundbreaking advanced analytics projects funded by prestigious federal agencies, including the Department of Defense and NASA. His prolific scholarship is evidenced by more than 250 peer-reviewed articles and 12 influential books, making him a sought-after consultant and keynote speaker at national and international conferences. In addition to his research and teaching, Dr. Delen shapes the future of his field as the Editor-in-Chief of the Journal of Business Analytics and AI in Business (Frontiers in Artificial Intelligence), and as a senior or associate editor for several other top-tier journals. His exceptional contributions have been recognized through numerous federal grants and awards—including honors as an eminent professor, Fulbright scholar, Regents' Distinguished Teacher and Researcher, President's Outstanding Researcher, and Big Data Mentor.

Abstract

In today's rapidly evolving business landscape, terms like artificial intelligence, machine learning, business analytics, big data, business intelligence, and data science are more than buzzwords—they are revolutionizing decision-making and problem-solving. Although these terms are often used interchangeably, they all share a common purpose: leveraging sophisticated mathematical models, statistical techniques, and expert insights to extract actionable intelligence. But why has data science emerged as a cornerstone of modern innovation? Is it a novel concept or simply an evolution of traditional analytics? This keynote presentation will unravel these questions by demystifying the underlying concepts of data science and business analytics. Drawing on compelling real-world case studies—from healthcare and medicine to entertainment and education—it will illustrate how data-driven strategies are transforming industries and shaping the future of business. Join us to explore the cutting edge of analytics and discover how to harness its power to drive innovation and solve today's most pressing challenges.

Keynote Speech

Prof. Josef Jablonsky

Prague University of Economics and Business, Czech Republic

Ranking models in data envelopment analysis: theory and practice

Short Biography

Prof. Josef Jablonsky is a professor and Head of the Department of Econometrics, Prague University of Economics and Business. He is focused on the theory and applications of data envelopment analysis, multiple criteria decision making, and mathematical modelling. He was principal investigator of several successful national and international projects. Professor Jablonsky is former President and still active member of the Czech Society of Operational Research, and other domestic and international professional societies. He is a member of editorial boards of several journals and scientific committees at the universities mainly in the Central European region. He published more than 50 papers indexed in world databases as Web of Science or Scopus and numerous publications in conference proceedings. Professor Jablonsky was the main organizer of the successful EURO conference in Prague with more than 2000 participants in 2007, and member of the programme or organizing committees of other national or international scientific events.

Abstract

Data envelopment analysis (DEA) is a non-parametric technique for evaluation of relative efficiency of decision making units (DMUs) described by multiple inputs and outputs. It is based on solving linear programming problems. Since 1978 when basic DEA model was introduced many its modifications were formulated. Multi-stage DEA models with serial or parallel structure, multi-period DEA models, inter-temporal models and integer DEA models belong among the most important ones. DEA models usually split DMUs into two basic groups, efficient and inefficient. Efficiency score of inefficient units allows their ranking but efficient units cannot be ranked directly because of their maximum identical efficiency scores. There were introduced various models for ranking of efficient DMUs in the past and the research in this field is not finished yet. Ranking models are based on different methodological principles – super-efficiency models, cross efficiency evaluation, pessimistic and optimistic models, goal programming, and others. The aim of this paper is to summarize main approaches for ranking of DMUs in several classes of DEA models (traditional models, network models, multi-period models). In addition, the study introduces an original optimization-based aggregation procedure for deriving a final ranking of units from several particular rankings, The results are illustrated on several real cases – efficiency evaluation of faculties, ranking of scientific journals, and evaluation of bank branches Numerical experiments are performed using own procedures written in LINGO modelling language.

Keynote Speech

Prof. Sadia Samar Ali

Department of Industrial Engineering, Faculty of Engineering, King Abdulaziz University, Saudi Arabia

A Novel Hybrid Decision-Making Natural Resource-based Framework for Measuring Circular Economy 4.0 Performance for Textile Industry

Short Biography

Prof. Sadia Samar Ali is a Full Professor in the Department of Industrial Engineering at King Abdulaziz University in Jeddah, Saudi Arabia. She holds a Ph.D. in Operations Research, specializing in Supply Chain Management for Consumer Analytics. With a strong background in engineering and management, Dr. Ali focuses her research on Circular Sustainable Supply Chain Management and the application of AI/ML optimization techniques in developing countries. She is actively involved in international groups like EURO and IFORS, promoting sustainable practices and smart technologies. Her impressive body of work includes 100 + published papers, with many in top-tier journals, alongside three authored books. As an Associate Editor for Environment, Development and Sustainability (ENVI), a Springer Publications, Green Technologies and Sustainability (GTS), jointly sponsored by Elsevier and China Science Publishing & Media Ltd (KeAi) and PLOS One, she contributes significantly to the field while mentoring students and enhancing their research capabilities. Her expertise has also led her to serve as a reviewer, editorial board member in 40+ international journals, keynote speaker at various international forums on applications of data analytics and optimization in the field of technology integration such as UAVs.

Abstract

The sustainability strategy focuses on conscious production and consumption, with the Circular Economy (CE) as an innovative approach to maximize resource value and minimize waste. Industry 4.0 technologies like AI, robotics, and blockchain significantly enhance the competitiveness of businesses pursuing the CE. These advanced technologies help organizations achieve sustainability goals within the CE framework. The study analyzes how Industry 4.0-driven CE practices impact sustainable business performance, using the Indian textile industry as a case study. The researchers developed a three-stage hybrid decision-making framework, integrating various methods to assess sustainable performance. A novel multi-stage hybrid decision-making framework was developed after Kendall's Agreement Test (Kendall's W), Fuzzy Delphi analysis. Then Best Worst Method (BWM), Full Consistency Method (FUCOM), and Combined Compromise Solution (CoCoSo) methods are used. The findings highlight positive outcomes such as enhanced incentives, government support, greener logistics, and improved emissions, waste, and pollution monitoring. However, there is room for further improvements to address market demand and increase the profitability of green products.

Workshop

Dr. Meenakshi Kaushik

Tecnia Institute of Advanced Studies, GGSIPU
(Guru Gobind Singh Indraprastha University),
India

The Role of AI Chatbots in the Future of Work: The Impact of Chatbots on Human Social Behavior

Short Biography

Dr. Meenakshi Kaushik is a distinguished Professor with over 18 years of experience in higher education, specializing in Human Resource Management and Development. Currently affiliated with the Lloyd Group of Institutions in Greater Noida, she has demonstrated exceptional leadership as a dean and academic administrator throughout her career. Her scholarly contributions include multiple publications in international journals and three significant books: "Digital Transformation: Recent Trends and Practices" (Himalaya Publications), "The Mystical Realm of Nidhivan in Vrindavan," and her latest work "Embracing AI Revolution in Education Industry" (2025), which explores the transformative impact of artificial intelligence on educational paradigms. Dr. Kaushik has garnered international recognition for her expertise, serving as a keynote speaker and panel chair at prestigious conferences including "ENTENTE 2022" Conference at NIIT University, Neman, ODSIE 2024 in Istanbul and SEMIT 2024 in Ankara , 12th International Conference on Management Practices & Research at APEEJAY School of Management, Dwarka, Publication Chair & as a Keynote Speaker in 2024 International Conference on Education, Psychology and Modern Management (ICEPMM 2024), China and many other conferences and Summits. Her recent accolades include the LREA Award 2024 from the London School of Digital Business for outstanding contributions to the Education Industry. She is also Invited as an Expert for Thesis Evaluation and Viva voce in the Department of Management Aligarh Muslim University (AMU) for PhD candidates, demonstrates her commitment to her academic excellence. Dr. Kaushik's latest book reflects her vision of integrating AI technologies into educational frameworks, building upon her extensive experience in academic leadership and research mentoring.

Abstract

As AI chatbots are increasingly integrating into our professional ecosystems, they are fundamentally reshaping not just how we work, but how we interact with one another in workplace settings. This workshop explores the dual transformation occurring as chatbots become our digital colleagues—while they enhance productivity and streamline communication, they simultaneously influence our social dynamics, emotional intelligence, and interpersonal skills. Dr. Meenakshi Kaushik will guide participants through examining how prolonged interaction with AI systems affects our capacity for human empathy, the evolution of workplace communication patterns, and the critical balance between leveraging AI efficiency while preserving the irreplaceable value of human connection in collaborative environments. Participants will gain insights into navigating this new landscape where the boundaries between human and artificial interaction continue to blur, preparing them to harness AI's potential while safeguarding the essential human elements that drive innovation and meaningful work relationships.

Workshop

Mr. Harshavardhan Yedla

Wipro LLC, USA

Next Generation Industrialization with AI: Revolutionizing Healthcare, Finance, and Transportation for Operational Efficiency and Innovation

Short Biography

Mr. Harshavardhan Yedla is a seasoned IT professional with 18 years of experience in implementing and architecting digital technologies, having made significant contributions at renowned organizations like Wipro, Persistent & Genpact. His expertise encompasses a broad spectrum of areas including Data Engineering, AI/ML, Cloud Solutions & Business Transformation. Mr. Yedla has successfully led cross-functional teams, managed complex data transformation projects & driven innovative solutions across various domains such as finance, healthcare, and manufacturing & Supply Chain. He has published scholarly articles on advanced forecasting techniques and environmental sustainability and actively contributes as a reviewer for numerous international conferences and journals. His role as a Principal Architect Practitioner has seen him leading transformative projects at prominent companies like Disney+, Zelle, Walmart, GE where he has shaped technology roadmaps and enhanced business processes. Yedla is a Senior Member of IEEE and a Fellow of the IETE & SAS Society, Mr. Yedla continues to drive strategic initiatives and provide thought leadership in the realms of data analytics and digital transformations & AI.

Abstract

Artificial Intelligence (AI) is transforming a broad range of industries, driving improvements in efficiency, innovation, and decision-making. AI is enabling personalized medicine and enhancing diagnostic precision in the healthcare industry. In finance, AI streamlines operations improves risk management, and offers customized services that enhance customer satisfaction. It facilitates hyper-personalization, increases sales, and optimizes supply chains in retail and e-commerce. The manufacturing sector is benefiting from predictive maintenance and autonomous operations, boosting productivity and minimizing downtime. While crop management and resource efficiency promote sustainable farming practices in digital agriculture. AI is widely utilized by the real estate sector for property valuation and smart building management, improving energy efficiency and tenant satisfaction. AI optimizes delivery routes, supports autonomous vehicles, and improves traffic management, lowering costs and increasing safety in transportation and logistics. Public sectors and governments are adopting AI for predictive modeling and policy simulation, leading to better governance. These innovations demonstrate AI's transformative potential, driving measurable ROI, fostering sustainability, and leading to informative decision-making across industries.

Workshop

Dr. Ali Bagheri

CEO of META INNOVATION Company, Dubai, UAE

Agentic AI: Revolutionizing Business Intelligence and Strategic Innovation for Agile Organizations

Short Biography

Dr. Ali Bagheri is a lifelong learner, who wants to be the kind of mentor and coach for youngers, that he wishes he had at their age. He considers his studies as a tool to create a better life for all people around the world.

Abstract

In an era where rapid technological advancement dictates market dynamics, organizations must adopt cutting-edge tools to maintain competitive agility. This lecture introduces Agentic AI—a transformative paradigm in artificial intelligence characterized by autonomous decision-making, proactive strategy formulation, and dynamic execution. Unlike conventional Business Intelligence (BI) tools that offer retrospective insights, Agentic AI operates as an active collaborator, enabling real-time predictive analytics, adaptive process optimization, and innovation-driven entrepreneurship.

Workshop

Mr. Chirag Agrawal

Novelis Inc. Atlanta, USA & IEEE Senior Member

AI in Manufacturing

Short Biography

With over 15 years of leadership at the intersection of Data Science, Artificial Intelligence, and Cloud Transformation, **Mr. Chirag Agrawal** drives enterprise-wide innovation through Generative and Agentic AI. As the Global Head of Data Science at a leading manufacturing organization, he has spearheaded transformative initiatives that solve complex, real-world challenges at scale. His unique blend of engineering rigor—grounded in a Mechanical Engineering background—and advanced expertise in Machine Learning enables him to architect AI solutions that are both technically robust and strategically aligned with business outcomes.

Abstract

AI Application in Manufacturing Industry. I will review some of the use cases that utilize computer vision, Simulation, AI/ML within the company, and their impact on the industry. This will help other users ask questions and understand the possibilities of implementing machine learning-based use cases in their organizations.

Workshop

Dr. Kaveri C S.

Department of Management Sciences,
Tecnia Institute of Advanced Studies, India

Dr. S. Saiganesh

School of Commerce & Management,
Dayananda Sagar University, India

Artificial Intelligent Agents as Digital Co-Workers: Collaboration Between Humans and Machines

Short Biography

Dr. Kaveri has 13 years of experience in teaching, 9 years in research & training and 14 years in administrative roles. She received her Doctorate in Human Resources from Dayananda Sagar University, India. Prof.Kaveri did her Master's in Business Administration in Human Relations. She has published more than 30 articles in National and International journals and conferences, presented more than 5 papers in India and also actively blogs on Management concepts. Prof. Kaveri has attended workshops in premier institutes like Bangalore University, IFIM and Dayananda Sagar University. She has published a book on Human Resource Management with a publisher in India. She is also the Editor for the book "Futuristic Trends in Management". She has guided PG students in all her teaching career. Prof. Kaveri has conducted a workshop for PG students on the topic "Struggles faced by candidates as fresher's". She has secured Best paper awards, Best paper presenter award and Certificate of Excellence for presenting research papers. She is the Chief Convener for various international conferences, FDPs and MDPs. She has also received the prestigious Certificate of Appreciation from IBIMA, for her services to the academic community by serving on the International Committee Board of the 39th IBIMA International Conference November, 2021, Seville, SPAIN., and 41st IBIMA International Conference May, 2023, Granada, Spain. Prof.Kaveri has also secured three Certifications from Harvard Business Publishing. She has also qualified herself with two NPTEL courses. Currently she is an Associate Professor cum Academic Head at Tecnia Institute of Advanced Studies, New Delhi.

Prof. S. SaiGanesh has 22 years of experience in teaching, 17 years in research and training. He received his Doctorate in Marketing from Periyar University, India. Prof.Ganesh did his Master's in Business Administration, Advertising and Public Relations. He has published more than 20 articles in National and International journals and conferences, presented more than 30 papers in India and Malaysia and also actively blogs on Management concepts. Prof.Ganesh has attended workshops in premier institutes like Indian Institute of Management and Indian Institute of Technology. He has produced two PhDs of Bharathiar University and served as examiner for PhD Viva Voce Examination for various Universities. He is in the Doctoral committee for PhD Scholars of Bharathiar University, SRM University, Madurai Kamaraj University, Jain University and Periyar University. He has published a book on Audience Behaviour with a publisher in Germany. He has evaluated more than 35 theses of various universities. Prof. Ganesh has conducted training programs on Research Methodology, Interview skills, soft skills workshops

and career guidance programs for many candidates from schools, colleges and NGOs. He has been invited by various colleges as guest to deliver keynote address & lectures on various topics. Prof.Ganesh is in the Editorial Board of many International Journals published from India, Ghana, Nigeria and the USA. He has also coordinated EPGDM Program and working as Registrar, and Professor of Marketing, Dayananda Sagar Business School, Bangalore. Currently he is Professor of Marketing and Research Guide at Dayananda Sagar University, Bangalore.

Abstract

A new era of hybrid work is about to begin, in which companies will connect humans and AI agents as co-workers rather than just combining remote and in-person employees. Unlike today's popular Gen AI tools, these AI agents will be able to make and act on decisions on their own without the need for extensive user input. For instance, they will be able to understand context, adjust quickly to new information, come up with ideas on their own, and even collaborate with human co-workers to complete challenging and diverse tasks. AI agents will soon be able to work alongside humans as real co-workers, not just to supplement them. These hybrid teams promise to open up new avenues for competitive advantage that go far beyond small increases in productivity by fusing human and artificial intelligence skills. This impending change also necessitates careful leadership to strike a balance between AI technologies and human labor to optimize each distinct advantage. This workshop will aim and highlight how AI agents are going to become digital co-workers to humans, with the help of AI how humans are going to use AI to get the best out of it at the same time how careful leadership can strike a balance between machines and humans in various business activities.

Workshop

Dr. AbdulQuddus Mohammed
Higher Colleges of Technology, UAE

Chalkboards to Chatbots: Redefining Teaching in the AI Age

Short Biography

Award-winning academic leader with 20+ years in GCC higher education, specializing in AI, HR, and entrepreneurship. PhD & DBA holder with global HR certifications (FCIPD, SHRM-CP, PMP). Published 40+ papers and delivered keynote talks at global conferences on AI, HR analytics, SME innovation, and future of work. Recognized with Sheikh Mansour HR Research Award, ACBSP Teaching Excellence Award, and multiple faculty excellence honors. Proven record of mentoring student startups, leading industry collaborations, and inspiring Gen Z to thrive in the AI-driven future.

Abstract

This workshop guides educators through the transformative journey of adapting and thriving in the AI era. Participants will explore the limitations of current education models, the evolving job landscape, and the future-ready skills graduates need. The session introduces the Thrive AI Model—helping educators shift from content deliverers to student mentors. Attendees will practice prompt engineering, use AI tools for improving productivity in teaching, and discuss ethical implications of AI in education. The goal is to empower faculty to lead AI-driven change while preserving human connection in the classroom.

Symposium

Dr. Iryna Novakovska

National University of Life and Environmental Sciences of Ukraine, Ukraine

Food and Environmental Security in Global Challenges (FESGC 2025)

Short Biography

Dr. Novakovska Iryna is a professor at the Department of Land Cadastre of the National University of Life Resources and Environmental Management of Ukraine. Iryna holds a Master's degree in Geodesy and Land Management, a Doctor of Economics in the Economics of Environmental Management and Environmental Protection. She is a Corresponding Member of the National Academy of Agrarian Sciences of Ukraine in the specialty "Public Management and Administration (Land Use)". She has been an invited editor and reviewer for Ukrainian and foreign publications. She has supervised Master's and Doctor of Philosophy students. She is a co-author of over thirty articles in reputable indexed journals, 70 articles at international conferences, and 12 book chapters. Her teaching and research interests include issues of economics and environmentally sound land use, land cadastre, monitoring and management of land resources, and land and real estate valuation.

About FESGC 2025 Symposium

Food and environmental security have become one of the biggest global challenges of the 21st century. They cover not only the problem of providing enough food for the global population, but also the preservation of natural resources and maintaining the stability of ecosystems.

In the context of global challenges, these two aspects of security are closely related and interact, because changes in ecology directly affect food security, and non-compliance with the principles of sustainable development can lead to increased environmental disasters.

Food and environmental security are two inextricably linked aspects of global security. Their achievement requires not only effective technologies and sustainable development, but also collective efforts at the international level to solve global environmental and food problems.

Symposium Areas

1. Energy, Engineering Management and IT Technologies
2. Livestock, Food Technologies and One Health
3. Social Sciences in the Challenges of Our Time
4. Forest Policy and Technologies
5. Modern Agrotechnologies
6. Biotechnology, Ecology and Plant Protection
7. Global Challenges and Adaptation of Land Use Systems

8. Corporate Responsibility and Governance
9. Innovative Solutions for Ensuring Food Security
10. Rational Nature Management and Environmental Protection
11. Harmonization of National and International Approaches to Land Resources Management

Investment Attractiveness of Land Fund in Ensuring Food SecurityArtificial Intelligence (AI) is transforming a broad range of industries, driving improvements in efficiency, innovation, and decision-making. AI is enabling personalized medicine and enhancing diagnostic precision in the healthcare industry. In finance, AI streamlines operations improves risk management, and offers customized services that enhance customer satisfaction. It facilitates hyper-personalization, increases sales, and optimizes supply chains in retail and e-commerce. The manufacturing sector is benefiting from predictive maintenance and autonomous operations, boosting productivity and minimizing downtime. While crop management and resource efficiency promote sustainable farming practices in digital agriculture. AI is widely utilized by the real estate sector for property valuation and smart building management, improving energy efficiency and tenant satisfaction. AI optimizes delivery routes, supports autonomous vehicles, and improves traffic management, lowering costs and increasing safety in transportation and logistics. Public sectors and governments are adopting AI for predictive modeling and policy simulation, leading to better governance. These innovations demonstrate AI's transformative potential, driving measurable ROI, fostering sustainability, and leading to informative decision-making across industries.

Oksana L. Tonkha

Vladimir V. Otchenashko

Nataliya Yu. Shevchenko

Ruslana V. Postoy

Victoria I. Melnyk

Panels

Dr. Meenakshi Kaushik

Panel:

Management, Policy, and Sustainability in Education, Healthcare, and Enterprises

Dr. Mazdak Khodadadi Karimvand

Panel:

Safety and Reliability Engineering, System Engineering, and System Safety in Industry 4.0

Dr. Ammar Odeh

Panel:

Data Science and Knowledge Management in Engineering Management

Dr. Rohit Bansal

Dr. Gunjan Shuklaa

Dr. Pooja Chaturvedi Sharma

Panel:

Emerging Technologies for Sustainable Development

Dr. Ali Asghar Rahmani Hosseinabadi

Dr. Seyedsaeid Mirkamali

Dr. Mandana Mahmoudjanlou

Dr. Navid Naghsh

Panel:

Machine Learning and Information Technology in Advancing Health, Business, and Environment

Dr. Simerjeet Singh Bawa

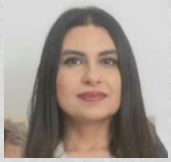
Panel:

Marketing and E-Marketing for Resources Management


Dr. Wided Oueslati


Dr. Afef Bahri


Dr. Sonia Nasri


Dr. Mouna Ben Brahim

Panel:

Machine Learning for Decision Making and Knowledge Discovery


Dr. Vani N. Laturkar

Panel:

Optimization and Decision-Making: Methods And Algorithms


Dr. Sonia Nasri


Dr. Hend Bouziri


Dr. Zouhour Ben Salem

Panel:

Intelligent Logistics Optimization: Reasoning, Deep Learning, and Predictive Approaches


Dr. Aybike Özyüksel Çiftçioğlu


Dr. Soheyl Khalilpourazari

Panel:

Data-Driven and Multi-Criteria Approaches for Sustainable and Safe Systems


Dr. Mohit Malik


Dr. Dhiraj Kumar Yadav


Dr. Parveen Siwach

Panel:

Artificial Intelligence, Optimization, and Decision Support in Engineering and Operations


Prof. Subhash Verma


Dr. Shashank Saxena


Dr. Sushil Kr. Dixit

Panel:

Machine Learning, Deep Learning, and Neural Networks

Prof. Vijay Kumar Gahlawat

Dr. Kumar Rahul

Dr. Mohit Malik

Panel:

Industry 4.0, supply chain 4.0, and logistics 4.0

Dr. Saeid Rezaei

Panel:

Decision-Making and Support Systems in an Uncertain Environment

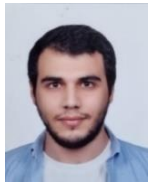
Dr. Mohsen Akbarpour Shirazi

Panel:

Artificial Intelligence and Digitalization for Sustainable and Resilient Societal Systems

Conference Program

"SEMIT 2025 is scheduled based on Dubai time zone"

Room 1	 **Leila Chehreghani** Sheffield, UK  **Ahmet Süha Hancıoğlu** Ankara Yıldırım Beyazıt University, Türkiye	Join Zoom Meeting Thursday: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74313348459 Friday: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672
Room 2	 **Mert Eyüboğlu** Ankara Yıldırım Beyazıt University, Turkey  **Dr. Gül Uslu** Sinop University, Turkey	Join Zoom Meeting Thursday: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=98691078028 Friday: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=95025242612
Room 3	 **Abdulrahim Taha Küçüköner** Ankara Yıldırım Beyazıt University, Turkey  **Vildan Tezcan** Ankara Yıldırım Beyazıt University, Turkey	Join Zoom Meeting Thursday: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=96147416379 Friday: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=97732624718
Room 4	 **Alperen Öncel** Ankara Yıldırım Beyazıt University, Turkey  **Şafak Kağar** Ankara Yıldırım Beyazıt University, Turkey	Join Zoom Meeting Thursday: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=94572281115 Friday: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=91428905374

- ***The conference programs are scheduled based on Dubai Time Zone (UTC+4)***
- ***This program will be updated continuously and you can see the latest version on:*** *https://semit2025.refconf.com/conference-schedule/*

First day: Thursday 11.09.2025

Location/time	9:00-10:30	10:30-10:45	10:45-12:15	12:15-13:30	13:30-15:00	15:00-15:15	15:15-16:45
Room 1 (Hybrid)	**Opening Ceremony** Keynote speech ***Prof. Dursun Delen***	Coffee Break	Workshop ***Dr. Ali Bagheri***	Lunch Break	Paper Session **Dr. Mohit Malik**	Coffee Break	15:15-16:00 Workshop ***Mr. Harshavardhan Yedla*** 16:00-16:45 Workshop ***Mr. Chirag Agrawal***
Room 2 (Online)	Closed	Break Time	**Symposium** **Dr. Iryna Novakovska** (Part 1)	Break Time	**Symposium** **Dr. Iryna Novakovska** (Part 2)	Break Time	**Symposium** **Dr. Iryna Novakovska** (Part 3)
Room 3 (Online)	Closed	Break Time	Paper Session **Dr. Mazdak Khodadadi Karimvand**	Break Time	Paper Session **Dr. Rohit Bansal**	Break Time	Paper Session **Dr. Vani N. Laturkar**
Room 4 (Online)	Closed	Break Time	Paper Session **Dr. Ammar Odeh**	Break Time	Paper Session **Dr. Simerjeet Singh Bawa**	Break Time	Paper Session **Dr. Sonia Nasri**

Second day: Friday 12.09.2025

Location/time	9:00-10:30	10:30-10:45	10:45-12:15	12:15-13:30	13:30-15:00	15:00-15:15	15:15-16:45
Room 1 (Hybrid)	9:00-9:45 Keynote speech ***Prof. Sadia Samar Ali*** 9:45-10:30 Workshop ***Dr. AbdulQuddus Mohammed***	Coffee Break	Paper Session **Prof. Subhash Verma**	Lunch Break	Paper Session **Dr. Ali Asghar Rahmani Hosseinabadi**	Coffee Break	**Closing Session** Keynote speech ***Prof. Josef Jablonsky***
Room 2 (Online)	Paper Session **Dr. Wided Oueslati**	Break Time	Paper Session **Dr. Aybike Özyüksel Çiftçioğlu**	Break time	Paper Session **Prof. Vijay Kumar Gahlawat**	Break Time	Closed
Room 3 (Online)	Paper Session **Dr. Meenakshi Kaushik**	Break Time	10:45-11:30 Workshop ***Dr. Meenakshi Kaushik*** 11:30-12:15 Workshop ***Dr. Kaveri C S.& Dr. S. Saiganesh***	Break time	Paper Session **Dr. Saeid Rezaei**	Break Time	Closed
Room 4 (Online)	**Symposium** **Dr. Iryna Novakovska** (Part 4)	Break Time	Paper Session **Dr. Mohsen Akbarpour Shirazi**	Break time	Closed	Break time	Closed

Third day: Saturday 13.09.2025

16:00-21:00
Desert Tour

Opening Session

Thursday, 11.09.2025, At 9:00 (Dubai time)

#	Title	Time	Duration (minutes)
1	Opening Presentation	9:00-9:05	5
2	Welcome Speech, Prof. Ergun Eraslan (Dean of Faculty of Engineering and Natural Sciences, AYBU)	9:05-9:15	10
3	Conference Report, Prof. A. Mirzazadeh (Conference Chair)	9:15-9:35	20
4	SEMIT 2025 Clip	9:35-9:40	5
5	Keynote Speech, Prof. Dursun Delen (Regents Professor at Oklahoma State University, Stillwater, OK, USA)	9:40-10:25	45
6	AYBU Clip	10:25-10:30	5

Closing Session

Friday, 12.09.2025, At 15:15 (Dubai time)

#	Title	Time	Duration (minutes)
1	Closing Presentation	15:15-15:20	5
2	SEMIT 2025 Clip	15:20-15:25	5
3	Prof. Babek Erdebilli (Conference Chair)	15:25-15:35	10
4	Keynote Speech, Prof. Josef Jablonsky (Prague University of Economics and Business, Czech Republic)	15:35-16:20	45
5	Closing Remarks, Prof. Mete Gundogan (Head of Department of Industrial Engineering, AYBU)	16:20-16:30	10
6	Appreciation	16:30-16:40	10
7	SEMIT 2025 Group Photo	16:40-16:45	5

Date**: Thursday, 11.09.2025** Time: **9:40-10:25**	**Keynote Speech**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74313348459 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu
Title: ***"Demystifying Data Science: Transformative Real-World Applications Driving Innovation"***		
Keynote Speaker: **Prof. Dursun Delen** Regents Professor at Oklahoma State University, Stillwater, OK, USA **&** Professor at Istinye University, Istanbul, Turkey		
Abstract: In today's rapidly evolving business landscape, terms like artificial intelligence, machine learning, business analytics, big data, business intelligence, and data science are more than buzzwords—they are revolutionizing decision-making and problem-solving. Although these terms are often used interchangeably, they all share a common purpose: leveraging sophisticated mathematical models, statistical techniques, and expert insights to extract actionable intelligence. But why has data science emerged as a cornerstone of modern innovation? Is it a novel concept or simply an evolution of traditional analytics? This keynote presentation will unravel these questions by demystifying the underlying concepts of data science and business analytics. Drawing on compelling real-world case studies—from healthcare and medicine to entertainment and education—it will illustrate how data-driven strategies are transforming industries and shaping the future of business. Join us to explore the cutting edge of analytics and discover how to harness its power to drive innovation and solve today's most pressing challenges.		

Date**: Thursday, 11.09.2025** Time: **10:45-12:15**	**Workshop**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74313348459 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu
Title: ***"Agentic AI: Revolutionizing Business Intelligence and Strategic Innovation for Agile Organizations"***		
Speaker: **Dr. Ali Bagheri** CEO of META INNOVATION Company, Dubai, UAE		
Abstract: In an era where rapid technological advancement dictates market dynamics, organizations must adopt cutting-edge tools to maintain competitive agility. This lecture introduces Agentic AI—a transformative paradigm in artificial intelligence characterized by autonomous decision-making, proactive strategy formulation, and dynamic execution. Unlike conventional Business Intelligence (BI) tools that offer retrospective insights, Agentic AI operates as an active collaborator, enabling real-time predictive analytics, adaptive process optimization, and innovation-driven entrepreneurship.		

Date: **Thursday, 11.09.2025** Time: **10:45-12:15**	Session Code: **SS01 (Part 1)**	**Room 2**, link: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=98691078028 Host: Mert Eyüboğlu and Dr. Gül Uslu

Title:

"Food and Environmental Security in Global Challenges (FESGC 2025)"

Symposium Organizers:

Dr. Iryna Novakovska, National University of Life and Environmental Sciences of Ukraine, Ukraine
Dr. Oksana L. Tonkha, Scientific Work and Innovation Activities, NUBiP of Ukraine, Ukraine
Dr. Vladimir V. Otchenashko, Head of the Scientific and Research Department, NUBiP of Ukraine, Ukraine
Dr. Nataliya Yu. Shevchenko, Head of the Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine
Dr. Ruslana V. Postoy, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine Ukraine
Dr. Victoria I. Melnyk, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine

Paper Code	Authors	Paper Title
1002-SEMIT2025	Olga Kruk; Anatoliy Ugnivenko; Tetyana Antonuk; Oleksandr Kolisnyk	Morphological Composition and Quality Features of Carcasses of Crossbred Bull Calves with Different Subcutaneous Fat Colours
1004-SEMIT2025	Olga Kruk; Anatoliy Ugnivenko; Tetyana Antonuk; Oleksandr Kolisnyk	Qualitative Characteristics Beef of 21-Month-Old Bulls of Ukrainian Black- Spotted Dairy Breed with Different Conformation (Meatiness) of Carcasses
1017-SEMIT2025	Serhii Vynohradenko; Arkadii Siedov; Roman Stupen; Oksana Stupen	Digital Instruments as a Catalyst for Harmonization of the Land Management System: International Experience and Ukrainian Perspectives
1019-SEMIT2025	Vladyslav Dorozhko; Nataliia Holembovska; Nataliia Slobodianiuk; Valentyna Israelian; Oleksandr Androshchuk	Improvement of Dried Products Technology with Modification of Flavor and Aromatic Properties with Integration of Smart Technologies

Date: **Thursday, 11.09.2025** Time: **10:45-12:15**	Session Code: **SP02**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=96147416379 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan
Title: ***"Safety and Reliability Engineering, System Engineering and System Safety in Industry 4.0"***		
Panel Chair: **Dr. Mazdak Khodadadi Karimvand**, Faculty of Engineering, University of Science and Culture, Iran		

Paper Code	Authors	Paper Title
1204-SEMIT2025	Mazdak Khodadadi Karimvand	A Review of Human Reliability Analysis Techniques in Oil and Gas Industries
1217-SEMIT2025	Gulberg Ergin; İbrahim Yılmaz; Ergün Eraslan	Assessment of Occupational Health and Safety Risks in Oil and Natural Gas Drilling Operations with Multi-Criteria Decision Making (MCDM) Methods
1245-SEMIT2025	Rehana Perveen; Rakesh Thakur; Aarti Hans; Shubneet; Anushka Raj Yadav; Navjot Singh Talwandi	Explainable Reinforcement Learning in Autonomous Navigation Systems
1030-SEMIT2025	Dmytro Novakovskyi; Oleksandr Kovalenko; Viacheslav Fomenko; Lidiya Smolenska; Nataliia Medynska; Iryna Novakovska	Assessment of the Impact of Financial Regulation on the Design of Industrial Facilities Regarding Environmental Issues Using Digital Technologies
1143-SEMIT2025	Nishant Rath	A Comparative Study of Wi-Fi, Cellular, and Satellite Internet Technologies: Performance, Accessibility, and Real-World Applications

Date: **Thursday, 11.09.2025** Time: **10:45-12:15**	Session Code: **SP03**	**Room 4**, link: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=94572281115 Host: Alperen Öncel and Şafak Kağar
Title: ***"Data Science and Knowledge Management in Engineering Management"***		
Panel Chair: **Dr. Ammar Odeh,** Princess Sumaya University for Technology, Jordan		

Paper Code	Authors	Paper Title
1138-SEMIT2025	Ammar Odeh; Walid Salameh; Tareq Alhajahjeh; Francisco Navarro; Aladdin Ayesh; Mohammad Abu Karim	Enhancing Data Security and Privacy Using Federated Learning: A Scalable Framework for Distributed Systems
1183-SEMIT2025	Sylwia Szybowska; Krzysztof Chochowski; Anna Chochowska	Social Media as a Space of Information
1137-SEMIT2025	Samet Tosun; Ibrahim Yilmaz	Comparative Analysis of Mental Workload of Academic Staff and Physicians with CarMen-Q Method
1154-SEMIT2025	Mete Gündoğan; Melike Kaya Akça; Çağrı Tekinbaş; Şeyma Demirci; Buse Kılıçaslan; Zafer Gülle	Organizational Resilience Measurement and Development Approaches at an Energy Production Company in Türkiye
1227-SEMIT2025	Osman Cayli	A Privacy-Compliant Blockchain-NLP System for Predictive Employment Agreement Management

Date: **Thursday, 11.09.2025** Time: **13:30-15:00**	Session Code: **SP11**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74313348459 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu

Title:

"AI-Driven Information Systems for Governance, Healthcare, and Sustainability"

Panel Chairs:

Dr. Mohit Malik, School of Business Management, Noida International University, India

Dr. Dhiraj Kumar Yadav, North Eastern Regional Institute of Science and Technology, India

Dr. Parveen Siwach, Symbiosis Centre for Management Studies, Noida Campus, Symbiosis International (Deemed University), India

Paper Code	Authors	Paper Title
1008-SEMIT2025	Ebrahim Rezaei; Josef Jablonsky	Government Digitalization and Tax Collection Efficiency in Emerging Economies
1054-SEMIT2025	Mobina Mousapour Mamoudan; Kamyab Sadeghzadeh; Parmida Bahreini; Nima Pourkhodabakhsh; Babek Erdebilli; Amir Aghsami	A Dynamic Forecasting and Multi-Objective Optimization Framework for Efficient Resource Management in Physiotherapy Center
1160-SEMIT2025	Rajesh Ranjan; Rashmi Singh; Saumya Tripathi	Harnessing Information Systems for Sustainable Enterprise Development: A Systematic Literature Network Analysis
1162-SEMIT2025	Jyoti Kunal Shah; Prashanthi Matam	XAI-Augmented Decision Support Systems for Complex, Multi-Criteria Problems in Uncertain Healthcare Environments
1194-SEMIT2025	Rajesh Ranjan; Rashmi Singh; Saumya Tripathi	The Role of Green Information Systems in India's Environmental Sustainability: A Review-Based Perspective

Date: **Thursday, 11.09.2025** Time: **13:30-15:00**	Session Code: **SS01 (Part 2)**	**Room 2**, link: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=98691078028 Host: Mert Eyüboğlu and Dr. Gül Uslu

Title:

"Food and Environmental Security in Global Challenges (FESGC 2025)"

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Dr. Ruslana V. Postoy, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine Ukraine
Dr. Victoria I. Melnyk, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine

Paper Code	Authors	Paper Title
1043-SEMIT2025	Melnychenko Svitlana; Kudinova Iryna; Mosiiuk Stefaniia; Samsonova Viktoriia; Neilenko Sergii	Eco-Friendly Hospitality in the Digital Era: Trends, Technologies, and Transformations
1056-SEMIT2025	Larysa V. Voitenko; Tatiana I Ushchapivska; Olha O. Kravchenko; Nadiia M. Prokopchuk; Leonid M. Abarbarchuk	Toward the Development of the Ukrainian Water Quality Index (UWQI)
1061-SEMIT2025	Marianna Stegnei; Iryna Kramarenko; Inna Irtyshcheva; Olena Ishchenko; Orshoia Nod; Viktor Neymet	Inclusive Development of Territorial Units Based on Smart Specialization as a Foundation for Environmental Security
1067-SEMIT2025	Liudmyla Hnatyshyn; Roman Velykyi; Oksana Prokopyshyn; Stanislav Vasylishyn; Kateryna Py-lypenko	Management Tools for Developing Competitive Advantages in Farming
1071-SEMIT2025	Lidiia Cherednyk; Ruslan Sopivnyk; Karina Juriivna Safian; Pavlo Smoliak; Roman Babkovych	Formation of Ecological Culture Among Future Specialists in the Agricultural Industry Within the Educational Environment of Life Sciences Universities

Date: **Thursday, 11.09.2025** Time: **13:30-15:00**	Session Code: **SP04**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=96147416379 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan

Title:

"Emerging Technologies for Sustainable Development"

Symposium Organizers:

Dr. Rohit Bansal, Adjunct Faculty, Rockford College, Sydney, Australia

Dr. Gunjan Shuklaa, SICA College, India

Dr. Pooja Chaturvedi Sharma, Apeejay School of Management, India

Paper Code	Authors	Paper Title
1034-SEMIT2025	Hrechanyk Nataliia; Oksana Vasiuk; Svitlana Vyhovska; Alen Zinoruk; Wang Qiang	The 21st Century University's Mission: Globalization's Challenges and Ukraine's Prospects
1127-SEMIT2025	Ivan Sadovyy; Nazar Stupen; Zoriana Ryzhok; Armands Celms	Analysis and Forecasting of Land Use Changes Using QGIS
1193-SEMIT2025	Abdullah Jafree; Md Alik Akandh; Kazi Jahid Hasan; Md. Salah Uddin	Addressing Technical Challenges and Workflow Optimization in 3D Prototype Manufacturing with Creality Ender 3 V2 Neo
1216-SEMIT2025	Parveen Siwach; Shubneet; Anushka Raj Yadav; Navjot Singh Talwandi	AI-Driven Threat Intelligence for Predictive Cyber Defense in Smart Cities
1231-SEMIT2025	GreenCode: AI-Driven Energy Efficiency Optimization in Legacy Mainframe Systems	Osman Cayli; Atinç Yilmaz

Date: **Thursday, 11.09.2025** Time: **13:30-15:00**	Session Code: **SP06**	**Room 4**, link: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=94572281115 Host: Alperen Öncel and Şafak Kağar
Title: ***"Marketing and E-marketing for resources management"***		
Symposium Organizers: **Dr. Simerjeet Singh Bawa,** Chitkara University, India		

Paper Code	Authors	Paper Title
1134-SEMIT2025	Seyedehyalda Saremi	The Strategic Role of Information Systems in Modern Business: Empowering Decision-Making and Sustaining Competitive Advantage
1158-SEMIT2025	Melih Sözdinler; Gökhan Akpınar; Eyüp Tolunay Küp; Mert Özçiçek; Aysima Bakırcılar; Ayşe Aygün Katircilar; Yalçın Doksanbir	AI-Powered Search Engine Optimization-Friendly Content Generation: Enhancing Visibility and Impression
1022-SEMIT2025	Volodymyr Nazarenko; Oksana Zazymko; Larysa Klikh; Mario Funderburk; Yaroslav Rudyk	Study of the Relevance of the Use of Interactive Simulations for Teaching Students of Technical and Technological Specialties
1066-SEMIT2025	Moein Attar; Hüseyin Canbolat	Noise Filtering in Simulated Temperature Rise Test Data of Transformers Using MATLAB
1283-SEMIT2025	Omnichannel Strategy and Customer-Centricity in E-Commerce: A Systematic Literature Review	Kishori Kasat; Naim Shaikh; Venkatesh Iyengar; Shradha Vernekar
1295-SEMIT2025	Rupinder Singh; Simerjeet Singh Bawa	A New Paradigm for Corporate Sustainability: Leveraging AI, IoT, and Predictive Analytics for ESG Monitoring

Date**: Thursday, 11.09.2025** Time: **15:15-16:00**	**Workshop**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74313348459 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu

Title:

"Next Generation Industrialization with AI: Revolutionizing Healthcare, Finance, and Transportation for Operational Efficiency and Innovation"

Speaker:
Mr. Harshavardhan Yedla
Wipro LLC, USA

Abstract:

Artificial Intelligence (AI) is transforming a broad range of industries, driving improvements in efficiency, innovation, and decision-making. AI is enabling personalized medicine and enhancing diagnostic precision in the healthcare industry. In finance, AI streamlines operations improve risk management, and offers customized services that enhance customer satisfaction. It facilitates hyper-personalization, increases sales, and optimizes supply chains in retail and e-commerce. The manufacturing sector is benefiting from predictive maintenance and autonomous operations, boosting productivity and minimizing downtime. While crop management and resource efficiency promote sustainable farming practices in digital agriculture. AI is widely utilized by the real estate sector for property valuation and smart building management, improving energy efficiency and tenant satisfaction. AI optimizes delivery routes, supports autonomous vehicles, and improves traffic management, lowering costs and increasing safety in transportation and logistics. Public sectors and governments are adopting AI for predictive modeling and policy simulation, leading to better governance. These innovations demonstrate AI's transformative potential, driving measurable ROI, fostering sustainability, and leading to informative decision-making across industries.

Date**: Thursday, 11.09.2025** Time: **16:00-16:45**	**Workshop**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74313348459 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu
Title: ***"AI in Manufacturing"***		
Speaker: **Mr. Chirag Agrawal** Novelis Inc. Atlanta, USA & IEEE Senior Member		
Abstract: AI Application in Manufacturing Industry. I will review some of the use cases that utilize computer vision, Simulation, AI/ML within the company, and their impact on the industry. This will help other users ask questions and understand the possibilities of implementing machine learning-based use cases in their organizations.		

Date: **Thursday, 11.09.2025** Time:**15:15-16:45**	Session Code: **SS01 (Part 3)**	**Room 2**, link: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=98691078028 Host: Mert Eyüboğlu and Dr. Gül Uslu

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Dr. Nataliya Yu. Shevchenko, Head of the Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine
Dr. Ruslana V. Postoy, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine Ukraine
Dr. Victoria I. Melnyk, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine

Paper Code	Authors	Paper Title
1075-SEMIT2025	Rostyslav Tarasenko; Svitlana Amelina; Liying Shen	IT technologies in Translation as an Important Component of Ukraine's Interaction with Partners in the Global Food Market
1088-SEMIT2025	Oleksandr Bondar; Oksana Butrym; George Panchenko; Svitlana Romanova; Vanda Baranovska	The Digitalization Role in Ensuring the Environmental and Economic Efficiency of Commodity Crops
1097-SEMIT2025	Iryna Belova; Olena Borysiak; Vasyl Brych; Antin Shuvar; Oleksiy Yaroshchuk	Assessing Climate and Economic Risks to Food Security in Europe: A Multiscenario and Lag-Based Modelling Approach
1098-SEMIT2025	Oksana Morhulets; Oleksandra Olshanska; Olena Cherniavska; Nataliia Buntova; Nataliia Moshenets	Strategic Mechanisms for Managing Sustainable Development Hospitality Industry in Ukraine
1106-SEMIT2025	Vitalii Ponomarenko; Roman Yakobchuk; Volodymyr Vasyliv; Mikhailo Mushtruk; Yaroslav Kyslytsia	Integrating Digital Technologies into the Design of Ejection Carbonization Systems to Reduce Greenhouse Emissions

Date: **Thursday, 11.09.2025** Time:**15:15-16:45**	Session Code: **SP08**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=96147416379 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan
Title: ***"Optimization and Decision-Making: Methods and Algorithms"***		
Panel Chair: **Dr. Vani N. Laturkar**, Swami Ramanand Teerth Marathwada University, India		

Paper Code	Authors	Paper Title
1140-SEMIT2025	Doruk Torunoğlu; Enes Can Erkoç; Zeynep Ece Abay; Syed Shah Sultan Mohiuddin Qadrı; Emre Can Gök; Deniz Karataş; Gamze Güçlüer	Design and Implementation of a Custom ERP Framework for a Drilling Equipment Manufacturer
1142-SEMIT2025	Servet Soyguder; Bülent Herdem	Online Optimal Appointment Time in Digital Health Platform by Fuzzy Logic-Based TOPSIS
1199-SEMIT2025	Abhijit Roy Abhi; Kazi Jahid Hasan; Md. Salah Uddin	A Comparative Study of AI-Generated 3D Models and Conventional Software-Based 3D Modeling Techniques: Accuracy, Efficiency, and Creative Potential
1236-SEMIT2025	Sara Hasheminezhad; Mahsa Moayed; Ardavan Babaei; Erfan Babaee Tirkolaee	Reinforcement Learning for Blockchain-Enabled Supply Chain Network Design
1253-SEMIT2025	Mahnaz Maghbouli; Azam Pourhabib Yekta	Efficiency Measurement using Non-parametric Analysis in Presence of Undesirable Outputs: A SBM-DEA Approach
1275-SEMIT2025	Gedefaye Achamu Meretie; Eshetie Berhan; Sisay Geremew Gebeyehu; Betsha Tizazu Abreham	Specification of lower and upper limits of crop yield using Evapotranspiration and the crop yield index

Date: **Thursday, 11.09.2025** Time:**15:15-16:45**	Session Code: **SP09**	**Room 4**, link: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=94572281115 Host: Alperen Öncel and Şafak Kağar

Title:

"Intelligent Logistics Optimization: Reasoning, Deep Learning, and Predictive Approaches"

Panel Chair:
Dr. Sonia Nasri, Ecole Supérieure de Commerce de Tunis, Université de la Manouba, Tunisia & LARODEC Laboratory, Institut Supérieur de Gestion de Tunis, Tunisia
Dr. Hend Bouziri, LARODEC, ESSECT, Tunisia
Dr. Zouhour Ben Salem, LARODEC, FSEG Nabeul, Tunisia

Paper Code	Authors	Paper Title
1122-SEMIT2025	Chaima Ben Othmen; Sonia Nasri; Hend Bouziri	Optimizing Non-Emergency Patient Transport with Variable Neighborhood Search: A Real-World Case Study
1123-SEMIT2025	Meriam Ayari; Sonia Nasri; Hend Bouziri	An Insertion Reasoning Approach based on Local Search
1124-SEMIT2025	Kamilia Bedhief; Sonia Nasri; Hend Bouziri	Greedy Insertion with Queue-based Retry and Dynamic Acceptance Control
1125-SEMIT2025	Souhir Benhdia; Zouhour Neji Ben salem; Hend Bouziri	Hybrid Deep Learning Models for Short-Term Forecasting Item Demands in Retail
1126-SEMIT2025	Hajer Dridi; Zouhour Neji Ben Salem; Hend Bouziri	Location Optimization of Micro-Depots in Urban Food Logistics

Date**: Friday, 12.09.2025** Time: **9:00-9:45**	**Keynote Speech**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu

Title:

"A Novel Hybrid Decision-Making Natural Resource-based Framework for Measuring Circular Economy 4.0 Performance for Textile Industry"

Keynote Speaker:
Prof. Sadia Samar Ali
Department of Industrial Engineering, Faculty of Engineering, King Abdulaziz University, Saudi Arabia

Abstract:

The sustainability strategy focuses on conscious production and consumption, with the Circular Economy (CE) as an innovative approach to maximize resource value and minimize waste. Industry 4.0 technologies like AI, robotics, and blockchain significantly enhance the competitiveness of businesses pursuing the CE. These advanced technologies help organizations achieve sustainability goals within the CE framework. The study analyzes how Industry 4.0-driven CE practices impact sustainable business performance, using the Indian textile industry as a case study. The researchers developed a three-stage hybrid decision-making framework, integrating various methods to assess sustainable performance. A novel multi-stage hybrid decision-making framework was developed after Kendall's Agreement Test (Kendall's W), Fuzzy Delphi analysis. Then Best Worst Method (BWM), Full Consistency Method (FUCOM), and Combined Compromise Solution (CoCoSo) methods are used. The findings highlight positive outcomes such as enhanced incentives, government support, greener logistics, and improved emissions, waste, and pollution monitoring. However, there is room for further improvements to address market demand and increase the profitability of green products.

Date**: Friday, 12.09.2025** Time:**9:45-10:30**	**Workshop**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu
Title: ***"Chalkboards to Chatbots: Redefining Teaching in the AI Age"***		
Speaker: **Dr. AbdulQuddus Mohammed** Assistant Professor in Business, Higher Colleges of Technology, UAE		
Abstract: This workshop guides educators through the transformative journey of adapting and thriving in the AI era. Participants will explore the limitations of current education models, the evolving job landscape, and the future-ready skills graduates need. The session introduces the Thrive AI Model—helping educators shift from content deliverers to student mentors. Attendees will practice prompt engineering, use AI tools for improving productivity in teaching, and discuss ethical implications of AI in education. The goal is to empower faculty to lead AI-driven change while preserving human connection in the classroom.		

Date: **Friday, 12.09.2025** Time: **9:00-10:30**	Session Code: **SP07**	**Room 2**, link: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=95025242612 Host: Mert Eyüboğlu and Dr. Gül Uslu

Title:

"Machine Learning for Decision Making and Knowledge Discovery"

Panel Chair:

Dr. Wided Oueslati, Ecole Supérieure de Commerce de Tunis, Université de la Manouba, Tunisia & BESTMOD Laboratory, Institut Supérieur de Gestion de Tunis, Tunisia

Dr. Afef Bahri, Ecole Supérieure de Commerce de Tunis, Université de la Manouba, Tunisia & SMART Laboratory, Institut Supérieur de Gestion de Tunis, Tunisia

Dr. Sonia Nasri, Ecole Supérieure de Commerce de Tunis, Université de la Manouba, Tunisia & LARODEC Laboratory, Institut Supérieur de Gestion de Tunis, Tunisia

Dr. Mouna Ben Brahim, Ecole Supérieure de Commerce de Tunis, Université de la Manouba, Tunisia & QUANLAB Laboratory, Ecole Supérieure de Commerce de Tunis, Université de la Manouba, Tunisia

Paper Code	Authors	Paper Title
1058-SEMIT2025	Afef Bahri; Wided Oueslati	Towards a RAG-Based Framework for Accounting Practices: Context-Aware Question Generation
1157-SEMIT2025	Mete Gündoğan; Melike Kaya Akça; Necati Arda Durkan; Burhan Altuntepe; Zülal Ceylan; Tolga Altın	Machine Learning and Time Series-Based Demand Forecasting in Turkish Textile Warehouses
1031-SEMIT2025	Mejri Siwar; Wided Oueslati	A lexicon-Based Approach for Identifying Influential Individuals within Social Networks
1029-SEMIT2025	Harshavardhan Yedla; Sreenivasa Rao Veeranki; Sravanti Thota; Jyothi VK	AI-Driven Flood Severity Forecasting for Sustainable Urban Development (SDG11): Comparing Regression, Ensemble, and Deep Learning Methods
1220-SEMIT2025	Buğra Erkartal; Atınç Yılmaz	Generating Crush Signals in Vehicle Traffic using RCNN, Hidden Markov Chain and ANN

Date: **Friday, 12.09.2025** Time: **9:00-10:30**	Session Code: **SP01**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=97732624718 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan
Title: ***"Management, Policy, and Sustainability in Education, Healthcare, and Enterprises"***		
Panel Chair: **Dr. Meenakshi Kaushik** Tecnia Institute of Advanced Studies, GGSIPU (Guru Gobind Singh Indraprastha University)		

Paper Code	Authors	Paper Title
1042-SEMIT2025	Oksana Sylka; Larysa Syniavska; Viktoriia Khvist; Yevheniia Shevtsova	Developing Students' Critical Thinking through the Analysis of Foreign Policy and the Use of Information and Analytical Tools
1052-SEMIT2025	Parmida Bahreini; Kamyab Sadeghzadeh; Yaser Samimi; Babek Erdebilli; İbrahim Yilmaz; Amir Aghsami	Integrated Queueing-Inventory Models: A Comprehensive Literature Review and New Thematic Classification
1184-SEMIT2025	Mostafa Esmaeili Mahyari; Hamid Reza Irani	Exploring Macro-Level Challenges in Health Tourism Development in Iran: Insights for Emerging Destinations
1112-SEMIT2025	Salma Hadj Taieb; Taicir Moalla Loukil; Yasmina Hani; Abderrahmane El Mhamedi	Routing for a Sustainable Future: A Systematic Review of Routing and Scheduling Problems in Home (Health)-Care Logistics
1230-SEMIT2025	Büşra Bülbül; Melike Çatakoğlu; Ümmügülsüm Daş; Tekin Karamavuş; Melike Pala; Betül Kayışoğlu	Scheduling of Pilot and Cabin Crew Training in Aviation
1261-SEMIT2025	Manolis Gkinoglou; Rachil Konstadinidi	ESG Implementation Costs: Optional Expenditure or Essential Commitment? The Case of PPC

Date: **Friday, 12.09.2025** Time: **9:00-10:30**	Session Code: **SS01 (Part 4)**	**Room 4**, link: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=91428905374 Host: Alperen Öncel and Şafak Kağar

Title:

"Food and Environmental Security in Global Challenges (FESGC 2025)"

Symposium Organizers:

Dr. Iryna Novakovska, National University of Life and Environmental Sciences of Ukraine, Ukraine
Dr. Oksana L. Tonkha, Scientific Work and Innovation Activities, NUBiP of Ukraine, Ukraine
Dr. Vladimir V. Otchenashko, Head of the Scientific and Research Department, NUBiP of Ukraine, Ukraine
Dr. Nataliya Yu. Shevchenko, Head of the Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine
Dr. Ruslana V. Postoy, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine Ukraine
Dr. Victoria I. Melnyk, Senior Researcher of Department of Scientific and Technical Information, NUBiP of Ukraine, Ukraine

Paper Code	Authors	Paper Title
1104-SEMIT2025	Nataliia Hryshchenko, Sergii Gryshchernko, Seniuk Olga, Kurochko Nataliia, Kremez Mykola, Moysey Igor	Principles of Building a Healthy Diet in Modern Industrial Pig Farming
1105-SEMIT2025	Korniyenko Valentina; Seniuk Olga; Gorovij Leontij	Ecological Protection of Plants Using Biological Products from the Basidiomycete Fungus Fomes Fomentarius
1114-SEMIT2025	Volodymyr Lytvynenko; Dmytro Liudvenko; Nadiia Tomilova-Yaremchuk; Serhii Khomovyi; Andrii Nepochatenko; Tamara Hurenko	Institutional Mechanisms of Digital Transformation of Accounting and Control in Agribusiness
1196-SEMIT2025	Naval Lawande; Pravin Dange	Do Farmers Matter to Agri-input Companies? A Quantitative Evaluation of CSR Stakeholder Prioritization in India
1206-SEMIT2025	Olena Hlazunova; Andrii Taranenko; Maryna Nehrey	Quantifying Agricultural Losses in Ukraine: A Data-Driven Approach to War-Induced Land Damage

Date: **Friday, 12.09.2025** Time: **10:45-12:15**	Session Code: **SP12**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu

Title:

"Machine Learning, Deep Learning, and Neural Networks"

Panel Chair:
Prof. Subhash Verma, School of Business Management, Noida International University, India
Dr. Shashank Saxena, Research Analyst, 13D Research & Strategy, India
Dr. Sushil Kr. Dixit, Professor, Lal Bahadur Shastri Institute of Management, Delhi, India

Paper Code	Authors	Paper Title
1130-SEMIT2025	Buse Özcan; Ece Bozkurt; Deniz Efendioğlu	A Regression-Based Analysis of Factors Influencing CO_2 Emissions Across Countries: A Systematic Literature Review
1132-SEMIT2025	Mahsa Fatemi Mehrabani; Mehrdad A Khafri; Mojtaba Esmaeilzadeh	Computational Modeling of Phase Transformation in 15-5PH Stainless Steel under Rapid Induction Heating using FEM–JMAK Framework
1139-SEMIT2025	Kıvılcım Naz Böke; Syed Shah Sultan Mohiuddin Qadrı; Ahmet Kabarcık	Intelligent and Energy-Aware Task Scheduling in Cloud Systems
1195-SEMIT2025	Abu Kausar; Abu Shahed Shah Md Nazmul Arefin; Mohidul Islam; Md. Salah Uddin; Kazi Jahid Hasan; S M Monowar Kayser; Md. Shafikul Islam	Comprehensive Review for Rice Blast Disease Using Deep Transfer Learning
1243-SEMIT2025	Kumar Rahul; Shraddha Verma; Charu Sood; Anushka Raj Yadav; Shubneet; Subhash Kumar Verma	A Privacy-Preserving and Explainable Machine Learning Model for Student Performance Prediction in Virtual Environments

Date: **Friday, 12.09.2025** Time: **10:45-12:15**	Session Code: **SP10**	**Room 2**, link: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=95025242612 Host: Mert Eyüboğlu and Dr. Gül Uslu

Title:

"Data-Driven and Multi-Criteria Approaches for Sustainable and Safe Systems"

Panel Chair:

Dr. Aybike Özyüksel Çiftçioğlu, Department of Civil Engineering, Manisa Celal Bayar University, Türkiye

Dr. Soheyl Khalilpourazari, Department of Mechanical, Industrial and Aerospace Engineering, Concordia University, Montreal, Canada

Paper Code	Authors	Paper Title
1234-SEMIT2025	Aybike Özyüksel Çiftçioğlu; M.Z. Naser	Data-Driven Assessment of Carbon Footprint in Concrete Mix Proportions: A Machine Learning Approach
1254-SEMIT2025	Tuba Irmak	Machine Learning-Based Multi-Class Classification of Physiological Signals from WESAD Dataset for Stress and Affective State Detection
1005-SEMIT2025	Furkan Güngör; Cansu Bozkurt; Mahmut Firat	Okullarda Su Verimliliğinin Sağlanması için Eğitim ve Kapasite Geliştirme Bileşenlerinin FUCOM Yöntemi ile Analizi
1006-SEMIT2025	Furkan Güngör; Cansu Bozkurt; Mahmut Firat	Su Tasarrufu Amacıyla Okullarda Denetim, Kontrol ve Bakım Bileşenlerinin FUCOM Yöntemi ile Değerlendirilmesi
1150-SEMIT2025	Mustafa Kemal Özbilger; İbrahim Yilmaz; Ergün Eraslan	Evaluation of Occupational Health and Safety Law Legislation Applications in the Construction Sector with Multi-Criteria Decision Making Methods
1151-SEMIT2025	Vecdi Osmanoğlu; İbrahim Yılmaz; Ergün Eraslan	A Multi-Criteria Decision-Making Approach to Evaluating Occupational Health and Safety Legislation Practices in the Aviation Sector
1250-SEMIT2025	Zeynep Beril Ersoy; Okan Fıstıkoğlu; Umut Okkan	Kavramsal Hidrolojik Model Kalibrasyonunda Evrimsel Algoritmaların Yakınsama Performansı: Amaç Fonksiyonu Çağrılarının Sayısının Etkisi

Date**: Friday, 12.09.2025** Time: **10:45-11:30**	**Workshop**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=97732624718 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan

Title:

"The Role of AI Chatbots in the Future of Work: The Impact of Chatbots on Human Social Behavior"

Speaker:
Dr. Meenakshi Kaushik, Tecnia Institute of Advanced Studies, GGSIPU (Guru Gobind Singh Indraprastha University)

Abstract:

As AI chatbots are increasingly integrating into our professional ecosystems, they are fundamentally reshaping not just how we work, but how we interact with one another in workplace settings. This workshop explores the dual transformation occurring as chatbots become our digital colleagues—while they enhance productivity and streamline communication, they simultaneously influence our social dynamics, emotional intelligence, and interpersonal skills. Dr. Meenakshi Kaushik will guide participants through examining how prolonged interaction with AI systems affects our capacity for human empathy, the evolution of workplace communication patterns, and the critical balance between leveraging AI efficiency while preserving the irreplaceable value of human connection in collaborative environments. Participants will gain insights into navigating this new landscape where the boundaries between human and artificial interaction continue to blur, preparing them to harness AI's potential while safeguarding the essential human elements that drive innovation and meaningful work relationships.

Date: **Friday, 12.09.2025** Time: **11:30-12:15**	**Workshop**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=97732624718 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan

Title:

"Artificial Intelligent Agents as Digital Co-Workers: Collaboration Between Humans and Machines"

Speaker:
Dr. Kaveri C S., Department of Management Sciences, Tecnia Institute of Advanced Studies, India
Dr. S.Saiganesh, School of Commerce & Management, Dayananda Sagar University, India

Abstract:

A new era of hybrid work is about to begin, in which companies will connect humans and AI agents as co-workers rather than just combining remote and in-person employees. Unlike today's popular Gen AI tools, these AI agents will be able to make and act on decisions on their own without the need for extensive user input. For instance, they will be able to understand context, adjust quickly to new information, come up with ideas on their own, and even collaborate with human co-workers to complete challenging and diverse tasks. AI agents will soon be able to work alongside humans as real co-workers, not just to supplement them. These hybrid teams promise to open up new avenues for competitive advantage that go far beyond small increases in productivity by fusing human and artificial intelligence skills. This impending change also necessitates careful leadership to strike a balance between AI technologies and human labor to optimize each distinct advantage. This workshop will aim and highlight how AI agents are going to become digital co-workers to humans, with the help of AI how humans are going to use AI to get the best out of it at the same time how careful leadership can strike a balance between machines and humans in various business activities.

Date: **Friday, 12.09.2025** Time: **9:00-10:30**	Session Code: **SP15**	**Room 4**, link: https://zoom.us/j/8087670437?pwd=ZDB5NXNMaUlDVERwOUkzcnRzenJPUT09&omn=91428905374 Host: Alperen Öncel and Şafak Kağar
Title: ***"Artificial Intelligence and Digitalization for Sustainable and Resilient Societal Systems"***		
Panel Chair: **Dr. Mohsen Akbarpour Shirazi** Amirkabir University of Technology, Iran		

Paper Code	Authors	Paper Title
1065-SEMIT2025	Moein Attar	Effects of an Electrostatic Screen Between LV & HV windings of a Transformer used in SPVPP on Harmonics
1225-SEMIT2025	Osman Cayli; Atınç Yılmaz	Design and Implementation of a Personalized AI-Powered Well-Being Assistant
1229-SEMIT2025	Osman Cayli	A Next-Generation AI-Enhanced Scheduling and Resource Optimization Framework for Educational Institutions: Leveraging LLMs and Intelligent Forecasting in Dynamic Learning Environments
1278-SEMIT2025	Mohammad Mehdi Namdar Joybari; Saeid Rezaei	Harnessing Artificial Intelligence for Predicting, Evaluating, and Shaping Public Policies: Toward Enhanced Social Resilience
1263-SEMIT2025	Maryna Gorobei; Oleksandr Bondar	Digitalisation for smart and climate-neutral cities: the case of Ukraine

Date: **Friday, 12.09.2025** Time: **13:30-15:00**	Session Code: **SP05**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu

Title:

"Machine Learning and Information Technology in Advancing Health, Business, and Environment"

Panel Chairs:

Dr. Ali Asghar Rahmani Hosseinabadi, Department of Computer Science, University of Regina, Canada
Dr. Seyedsaeid Mirkamali, Department of Computer Engineering and IT, Payame Noor University, Iran
Dr. Mandana Mahmoudjanlou, Department of Psychology Mazandaran Institute of Technology, Iran
Dr. Navid Naghsh, Department of Pharmacy, Shahid Sadoughi University of Medical Sciences, Iran

Paper Code	Authors	Paper Title
1145-SEMIT2025	Maryam Mardani; Sara Mardani; Ali Asghar Rahmani Hosseinabadi	Human Papillomavirus Detection using Novel Machine Learning Algorithm Based on Cytology Images
1188-SEMIT2025	Masud Ibrahim	The Influence of Digital Transformation on Customer Loyalty in the Banking Sector: The Mediating Role of Customer Experience
1190-SEMIT2025	Rajesh Ranjan; Rashmi Singh; Saumya Tripathi	Role of Information Technology in Advancing Sustainability in India: A Case Study Analysis
1202-SEMIT2025	Jan Francisti; Zoltán Balogh; Kristián Fodor	Smartwatch-Based Heart Rate Tracking
1135-SEMIT2025	Parisa Khosravi; Cosimo D'Aiello	Enhancing Wine Fermentation: The Role of AI-Driven Predictive Modeling in Flavor Optimization
1281-SEMIT2025	Citizen-Centered Efficiency Assessment of European Smart Cities: A DEA Perspective	Ivana Marjanović; Jelena Stanković

Date: **Friday, 12.09.2025** Time: **13:30-15:00**	Session Code: **SP13**	**Room 2**, link: https://zoom.us/j/9754498345?pwd=ZLplbb4n8Im15sk0TYKeKioyN6EYkc.1&omn=95025242612 Host: Mert Eyüboğlu and Dr. Gül Uslu

Title:

"Industry 4.0, Supply Chain 4.0, and Logistics 4.0"

Panel Chairs:
Prof. Vijay Kumar Gahlawat, Department of Interdisciplinary Sciences, NIFTEM-K, India
Dr. Kumar Rahul, Department of Interdisciplinary Sciences, NIFTEM-K, India
Dr. Mohit Malik, School of Business Management, Noida International University, India

Paper Code	Authors	Paper Title
1038-SEMIT2025	Larysa Savchenko; Karyna Safian; Olha Sozoni-uk; Iryna Palshkova; Svitlana Lisova	Integration of ISO Standards into the Educational Process of Training Teachers of Vocational (Professional and Technical) Education in Transport while Designing Logistics Systems
1133-SEMIT2025	Oleksandr Humennyi; Serhii Kubitsky; and Yuriy Ku-bitskyy	Smart Complexes in Engineering Education: A Postmodernist Approach to the Digital Learning Environment
1197-SEMIT2025	Abu kausar; Kishon kumar pasi; Mohidul Islam; Nushrat Jahan Bristi; Abu Shahed Shah Md Nazmul Arefin; Md. Salah Uddin	Cloud-Based Multi-Langual License Plate Recognition Using YOLO and OCR
1198-SEMIT2025	Erfan Kajabadi; Alireza Goli; Maryam Johari	A Framework for Blockchain-Enabled Sustainable Supply Chain
1237-SEMIT2025	Mohit Malik; Vijay Kumar Gahlawat	Revolutionizing Dairy Sustainability with Digital Technologies and Circular Economy Practices
1214-SEMIT2025	Maida Hassan Malik; Eveth N. Nwobodo-Anyadiegwu	Assessing the Adoption and Utilisation of the 4IR Technologies in South African Higher Education Institutions: An Empirical Study

Date: **Friday, 12.09.2025** Time: **13:30-15:00**	Session Code: **SP14**	**Room 3**, link: https://zoom.us/j/3963123956?pwd=WTJ0M3ZpaG5KcC9yaFRkQW1uMUpPdz09&omn=97732624718 Host: Abdulrahim Taha Küçüköner and Vildan Tezcan
Title: ***"Decision-Making and Support Systems in an Uncertain Environment"***		
Panel Chair: **Dr. Saeid Rezaei**, Arak University, Iran		

Paper Code	Authors	Paper Title
1192-SEMIT2025	Nihan Çağlayan; İbrahim Yilmaz; Babek Errdebilli	Hybrid MCDM Model for Evaluating Sustainable Logistic Village in Türkiye on Economic Perspective
1201-SEMIT2025	Andrij Fokin; Oksana Nechai; Igor Nechai	Modeling Changes in Resource Value of Biocenoses Under the Impact of Local Catastrophes Caused by Military Actions
1218-SEMIT2025	İclal Bağcı; Paria Jabbari; Kemal Subulan; Adil Baykasoğlu; Şeyda Ayşe Yıldız	A Dynamic Capability-Based Part Flow Assignment Problem with a Multi-Stage Stochastic Programming Approach
1221-SEMIT2025	Paria Jabbari; İclal Bağcı; Kemal Subulan; Adil Baykasoğlu; Şeyda Ayşe Yıldız	Fuzzy Inner Approximation Approach to an Unequal-Area Facility Layout Design Problem with Fuzzy Department Areas
1235-SEMIT2025	Kubra Ozdemirci; Babek Erdebilli	Performance Evaluation with Mamdani Type Fuzzy Inference System

Date: **Friday, 12.09.2025** Time:**15:35-16:20**	**Keynote Speech**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu
Title: ***"Ranking Models in Data Envelopment Analysis: Theory and Practice"***		
Keynote Speaker: **Prof. Josef Jablonsky**, Prague University of Economics and Business, Czech Republic		

Abstract:

Data envelopment analysis (DEA) is a non-parametric technique for evaluation of relative efficiency of decision making units (DMUs) described by multiple inputs and outputs. It is based on solving linear programming problems. Since 1978 when basic DEA model was introduced many its modifications were formulated. Multi-stage DEA models with serial or parallel structure, multi-period DEA models, inter-temporal models and integer DEA models belong among the most important ones. DEA models usually split DMUs into two basic groups, efficient and inefficient. Efficiency score of inefficient units allows their ranking but efficient units cannot be ranked directly because of their maximum identical efficiency scores. There were introduced various models for ranking of efficient DMUs in the past and the research in this field is not finished yet. Ranking models are based on different methodological principles – super-efficiency models, cross efficiency evaluation, pessimistic and optimistic models, goal programming, and others. The aim of this paper is to summarize main approaches for ranking of DMUs in several classes of DEA models (traditional models, network models, multi-period models). In addition, the study introduces an original optimization-based aggregation procedure for deriving a final ranking of units from several particular rankings, The results are illustrated on several real cases – efficiency evaluation of faculties, ranking of scientific journals, and evaluation of bank branches Numerical experiments are performed using own procedures written in LINGO modelling language.

Date**: Friday, 12.09.2025** Time: **15:15-16:15**	**Room 1**, link: https://us04web.zoom.us/j/3882300602?pwd=urxoazDY6DsFbhBRsgYT8mhqzUwkuR.1&omn=74910183672 Host: Leila Chehreghani and Ahmet Süha Hancıoğlu

Closing Ceremony

#	Title	Time	Duration (minutes)
1	Closing Presentation	15:15-15:20	5
2	SEMIT 2025 Clip	15:20-15:25	5
3	Prof. Babek Erdebilli (Conference Chair)	15:25-15:35	10
4	Keynote Speech, Prof. Josef Jablonsky (Prague University of Economics and Business, Czech Republic)	15:35-16:20	45
5	Closing Remarks, Prof. Mete Gundogan (Head of Department of Industrial Engineering, AYBU)	16:20-16:30	10
6	Appreciation	16:30-16:40	10
7	SEMIT 2025 Group Photo	16:40-16:45	5

Date**: Saturday, 13.09.2025** Time: **16:00-19:00**
Dessert Tour
Title
Pick up- Drop off
Dune Bash
Sand Boarding
Open Buffet Dinner with Live Entertainment Shows
Soft Drinks
Henna Tattoo for Ladies
Shisha Corner
Camel Ride

Abstracts Proceedings

Table of Contents

SS01: Food and Environmental Security in Global Challenges (FESGC 2025)

Morphological Composition and Quality Features of Carcasses of Crossbred Bull Calves with Different Subcutaneous Fat Colours

Olga Kruk[*1], Anatoliy Ugnivenko[1], Tetyana Antonuk[1], Oleksandr Kolisnyk[2]

[1] Department of milk and meat production technologies, Faculty of Livestock Raising and Water Bioresources, National University of Life and Environmental Sciences of Ukraine, Kyiv, Heroiv Oborony st., 15, 03041

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Abstract

World standards for beef carcasses use the colour of subcutaneous fat tissue to assess carcass quality and value. The aim of the study was to determine the relationship between the morphological composition and quality traits of carcasses and the colour of subcutaneous fat tissue in 20-22 month old crossbred bull calves of Ukrainian Black and White dairy and Holstein cattle. The colour of fat tissue on the carcass of slaughtered animals was assessed in the slaughterhouse of Kalynivka village, Brovary district, Kyiv region, according to a 7-point scale in accordance with the methodology of the Japan Beef Grading Association JMGA (2000). The carcasses were divided into two groups according to the degree of yellowing of the fat tissue: I - from 3 to 4 points (excellent; n=11); II - from 5 to 6 points (good and average; n=15). In animals, 42.3% of the carcasses had a "moderately white" fat tissue colour and 57.7% had a "moderately yellow" colour. When fat colour under the skin was scored at 5 to 6 points, muscle colour was significantly ($P \leq 0.05$) better by 12.5% and fat thickness on the carcass by 50.0% compared to scores of 3 to 4 points. In the class of adipose tissue colour from 5 to 6 points, there was a tendency to deterioration of the amount of muscle tissue by 1.7%, the content of first grade meat by 1.5 and the content of second grade meat by 3.4% compared to the worst class (from 3 to 4 points). With a fat colour score of 5-6 points, the carcass tends to have a higher content of first class muscle tissue (by 0.3%), tendons and ligaments (by 9.1), bones (by 1.6), fat development (by 3.8), marbling of the meat (by 3.6) and the area of the muscle eye of the longissimus dorsi (by 6.6%). The overall correlation was significant ($P \leq 0.001$) and positive ($r=0.602$) only between the colours of fat and muscle tissue. The colour of subcutaneous fat tissue in crossbred bull calves from Ukrainian Black-and-White dairy cows and Holstein bulls cannot be used to predict the morphological composition and quality traits carcasses.

Keywords: Meat Productivity, Qualitative Features of Carcasses, Colour of Fat Tissue, Morphological Composition of Carcasses.

Qualitative Characteristics Beef of 21-Month-Old Bulls of Ukrainian Black- Spotted Dairy Breed with Different Conformation (Meatiness) of Carcasses

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Abstract

The purpose of this study is to evaluate the beef quality of bulls of Ukrainian black-spotted dairy cattle under different classes of carcass conformation in order to stimulate producers to increase the potential of livestock and to harmonize the standards of Ukraine with EU legislation in accordance with EUROP requirements regarding the classification of carcasses. The article characterizes the sensory and technological properties of beef and its chemical composition depending on the evaluation according to the EUROP requirements for the conformation (meatiness) of carcasses of 21-month-old bulls of Ukrainian black-spotted dairy breed. Immediately after the animals were slaughtered, according to methodology, the color of the muscle and fat tissue, the marbling of the meat, and the area of the "muscle eye" were evaluated. In minced meat from m. longissimus dorsi we investigated the total fat, protein, mass total ash, moisture, pH, penetration and moisture retention capacity. The broth and boiled meat were tasted. We found out that in beef, with the growth of the carcass conformation, the amount of subcutaneous fat, marbling class increases, its color and the area of the «muscle eye» and moisture retention capacity improve. Better carcass conformations are negatively correlated with beef quality indicators (pH, boiling, sensory properties of boiled meat and broth, fat content, dry and mineral matter, sideforce of cutting).

Keywords: Meat Efficiency, Bulls, Carcass Conformation, Adipose Tissue in the Middle of the Muscles, Ukrainian Black-Spotted Dairy Breed, Technological and Sensory Properties of Beef, Chemical Composition of Meat.

Digital Instruments as a Catalyst for Harmonization of the Land Management System: International Experience and Ukrainian Perspectives

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Abstract

The article examines how digital tools contribute to the harmonization of land management between national systems and international approaches. The authors emphasize the importance of geographic information systems (GIS), remote sens-ing (RS), electronic cadastres, open data and standardized models, such as LADM (Land Administration Domain Model) and INSPIRE, in the formation of integrated, transparent and effective land management systems. Examples of digi-tal technologies implementation in different countries are considered, this allows identifying the strengths and existing challenges in the process of land manage-ment digitalization in Ukraine. A comparative analysis of the institutional, legal and technological environment in selected countries is carried out. It is empha-sized that digital tools allow the convergence of methodologies, reduce data pro-cessing time on average by 40-60%, reduce the number of errors in cadastral rec-ords by over 35%, and increase citizens' access to services by at least 50% through the implementation of electronic platforms, improve the quality of ser-vices for citizens and provide a basis for transnational cooperation. Based on the analysis a structural and logical model for the harmonization of digital land man-agement tools in Ukraine with the European Union is formed, which includes components that ensure compatibility, data integration and effective land man-agement based on modern digital technologies. A model of multi-criteria harmo-nization assessment has been constructed, with an integral index $H = 0.625$, which reflects the general level of approximation to the target state of digital land management in Ukraine and means that the current state in Ukraine is at an aver-age level of development, but proper integration has not yet been achieved. As a result, a number of recommendations are proposed for Ukraine on the further in-tegration of digital tools into the field of land management according to European practices.

Keywords: Digital tools, Land management, Harmonization of land legislation, Implementation of European standards, GIS.

Improvement of Dried Products Technology with Modification of Flavor and Aromatic Properties with Integration of Smart Technologies

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Abstract

The article explores the possibilities of improving the nutrition system of military personnel of the Armed Forces of Ukraine by including high-quality, nutritious and convenient products in the daily ration, particularly fish snacks based on carp meat. The study aimed to develop recipe and technological solutions that provide attractive organoleptic properties, sufficient nutritional value, stable safety indicators and a long shelf life of the finished product. The paper substantiates the feasibility of using the process of marinating carp meat in "Satsebeli", "Barbecue", "Garlic" and "Sweet and Sour" sauces before drying. The analysis of the physicochemical characteristics of the sauces was carried out, and the influence of their composition on the moisture content of the finished product, water activity (Aw), and overall microbiological stability was studied. The organoleptic evaluation conducted by the tasting commission revealed the best sensory indicators in samples marinated in "Satsebeli" and "Barbecue" sauces. The developed product is characterized by high protein content, low water activity, pleasant taste and aroma, which makes it suitable for inclusion in individual rations of military personnel. An important aspect is the use of smart technologies that optimize production and quality control processes, as well as smart packaging, which provides additional product protection and helps preserve its properties for a long time. The study results can be used to expand the range of functional snacks and improve technological approaches in the field of military nutrition. Keywords: snacks, dried products, shelf life, sauces, military nutrition.

Keywords: Snacks, Dried Products, Shelf Life, Sauces, Military Nutrition.

Eco-Friendly Hospitality in the Digital Era: Trends, Technologies, and Transformations

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Abstract

This paper investigates the integration of ecological trends and digital innovations within the hospitality industry, focusing on the development of eco-hotels, eco-restaurants, and ecological tourism, while promoting environmental awareness and sustainable practices among the population. In response to current global and national challenges, including the environmental consequences in Ukraine, the study emphasizes the need for an eco-digital transformation of hospitality services. Employing abstract-logical, empirical, benchmarking, and economic-statistical methods, the research conceptualizes key components of eco-hospitality and identifies priority areas for rural guesthouse development, the implementation of international environmental certifications, and the integration of smart technologies to enhance service sustainability. The findings reveal a steady increase in eco-friendly hospitality establishments and confirm the crucial role of ecological tourism and digital solutions in minimizing anthropogenic pressure, fostering environmental awareness, and promoting sustainable development of territorial communities. The study highlights the potential of eco-hotels in Ukraine, validating the hypothesis concerning the industry's environmental impact, and proposes conceptual approaches for ecotourism strategies, regional digital projects, and smart hospitality infrastructure. The outcomes are significant for addressing environmental issues, reducing negative impacts from hospitality activities, and balancing stakeholder interests in delivering sustainable, tech-enhanced services.

Keywords: Rural Guesthouses, Hospitality Industry, Greening, Ecological Tourism, Digital Technologies.

Toward the Development of the Ukrainian Water Quality Index (UWQI)

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Abstract

Nowadays, the Water Quality Index (WQI) is a popular tool for evaluating water quality holistically, combining physical, chemical, and biological parameters into a unified dimensionless score that provides an intuitive measure for end-users. Conventional WQI development typically follows four key phases: selecting relevant parameters, standardizing raw data, assigning weighting factors, and synthesizing sub-indices. This research introduces a novel methodology for establishing a national WQI customized to Ukraine's regulatory framework and hydrological conditions, with principal innovations: using the Harrington desirability function to normalize parameter-specific measurements and synthesize sub-indices, improving analytical precision and clarity; design of desirability criteria compliant with Ukrainian legal standards for water-use scenarios such as drinking human water consumption, agricultural irrigation, livestock and poultry watering, and aquatic farming, thereby addressing region-specific regulatory demands; development of a Python-powered WQI Calculator to streamline data transformation, supporting reproducible and efficient water quality analysis. This framework establishes a dynamic, transparent, and context-sensitive WQI system by aligning ecological safety benchmarks with national water management priorities.

Keywords: Ukrainian Water Standards, Ukrainian Water Quality Index, Python-Based Tool.

Inclusive Development of Territorial Units Based on Smart Specialization as a Foundation for Environmental Security

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Abstract

In conditions of martial law, an important task for the country's economy is to develop an inclusive development model that takes into account the specific char-acteristics of each region. The model of inclusive development of territorial units should include environmental, economic and social components and be based on the principles of smart specialization. The objective of this article is to analyze the process of substantiating the for-mation of an inclusive development model for territorial units based on Smart Specialization in the context of martial law and post-war reconstruction. The re-search methods used in the study include content analysis, the abstract-logical method, statistical observations, and economic-statistical calculations. The authors improved methodological approaches for selecting types of eco-nomic activity based on additional indices, such as the specialization index, social efficiency index, budget efficiency index, export capacity index, and others. These methodological approaches provide a comprehensive justification for re-gional and territorial Smart Specialization projects, taking into account regional specifics and the characteristics of various economic activities. During the testing of these methodological approaches using the example of the Zakarpattia region, it was determined that the most significant economic ac-tivities in terms of gross value added are: temporary accommodation and food service activities, including tourism; transportation, warehousing, postal, and cou-rier activities; creative studios; eal estate transactions. The obtained results can be valuable for strategic economic planning in the region, aiming to support and de-velop these key industries and substantiate the region's Smart Specialization based on economic parameters.

Keywords: inclusive regional development, sustainable development model, Smart Specialization, ranking of economic activities, cluster, war, post-war re-construction.

Management Tools for Developing Competitive Advantages in Farming

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Abstract

The article discusses practical recommendations for assessing competitiveness and implementing management tools for farm competitiveness. The methodical approaches to using management tools for developing competitive advantages in farming are outlined. These management tools encompass a variety of measures designed to adapt to market conditions, implement innovations, optimize costs, enhance product quality, and assess the impact of management decisions. The recommended management strategies enable timely adjustments to the farm's competitiveness strategy or modifications to approaches aimed at reducing risks and uncertainties. The results of the survey indicate that there is a diverse range of opinions among experts regarding the assessment of farms' competitive advantages based on the competitive advantage coefficient. Thus, the selection of which management measures to employ is based on a differential assessment, considering the overall competitiveness level and the values of the competitive advantage coefficients for the farm. Implementing the innovative Lean management concept can assist farmers in identifying and eliminating unnecessary costs at every stage of production. Research indicates that Lean principles and tools are predominantly utilized in production, with approximately 60% of participants employing Lean to enhance competitiveness. Lean management focuses on creating value, ensuring that the final product aligns more closely with customer expectations, and enhancing competitiveness. Furthermore, involving staff in the improvement and decision-making processes helps keep them motivated and committed to the farm.

Keywords: Management, Farms, Competitiveness, Activity, Management Tools, Mechanism, Strategy, Evaluation, Management Decisions Management, Farms, Competitiveness, Activity, Management Tools, Mechanism, Strategy, Evaluation, Management Decisions.

Formation of Ecological Culture Among Future Specialists in the Agricultural Industry Within the Educational Environment of Life Sciences Universities

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Abstract

This article examines the features of ecological culture formation among future specialists in the agricultural industry in the context of contemporary challenges to sustainable development. The significance of the educational environment of life sciences universities is substantiated as a crucial factor in the ecological education and upbringing of students. Emphasis is placed on an interdisciplinary approach to education, the integration of ecological knowledge into professional training, the combination of theoretical and practical components of education, and the importance of non-formal learning. The role of innovative pedagogical technologies and research activities in shaping ecological worldviews is clarified. Key directions for improving the educational process in life sciences universities are identified to cultivate environmentally responsible professionals. The article may be of value to researchers, educators, students, and administrators in the fields of education and environmental management.

Keywords: Ecological Culture, Educational Environment, Life Sciences Universities, Ecological Culture Formation, Information and Communication Technologies in the Formation of Ecological Culture.

IT technologies in Translation as an Important Component of Ukraine's Interaction with Partners in the Global Food Market

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Abstract

The problem of overcoming hunger worldwide is extremely important. Solving it requires coordination and communication between different countries. The paper deals with the problem of using information technologies for translation of mate-rials in the agricultural sector to ensure interaction of Ukrainian producers with partners from other countries in the international food market. The purpose of this article is to consider the possibility of using cloud-based machine translation sys-tems based on artificial intelligence (AI) for this task. We used methods of com-parison, analysis, synthesis and description. We compared the functional indica-tors of three leading systems: Google Translate, DeepL, and SYSTRAN. We have conducted an experimental study to compare the adequacy of translation of texts from different fields of the agricultural sector by these systems. The evalua-tion criteria were various aspects of equivalence, namely: semantic, informational, denotational, terminological, syntactic, pragmatic, and dynamic. Each of them was measured by three levels of equivalence: low, medium, high. The branches cho-sen for the experiment were engineering, veterinary medicine, animal husbandry, fish farming, forestry, horticulture, crop production, biotechnology, and plant protection. Our findings demonstrate that the levels of translation adequacy for different branches of the agricultural sector in each of these systems vary, but are generally satisfactory after post-editing.

Keywords: Information Technology, Translation, Cloud-Based Machine Translation Systems, Food Market, Agricultural Sector.

The Digitalization Role in Ensuring the Environmental and Economic Efficiency of Commodity Crops

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Abstract

It is established that digitalization determines the method of organizing produc-tion, focused on achieving ecological and economic optimum with the basic component of climate neutrality in the use of resource potential while maintaining acceptable levels of profitability through automation and robotization of process-es and systems in the commodity crop production sector. It is emphasized that the commodity crop production sector has one of the most powerful potentials for the implementation of digitalization, which opens the way to restoration and preservation of agricultural resource potential and further increase the resilience of agricultural landscapes to anthropogenic loads. On this basis and considering the previous authors' works, a structural and logical scheme for implementing digitalization of commodity crop production monitoring is proposed as a com-plexly systematical approach for optimization monitoring. Indicated allows min-imizing the level of anthropogenic load of this economy branch on the agro-ecosystem. It is substantiated that the intensification of monitoring on new prin-ciples with the correct selection of key nodes and components of the agricultural production cycle, which is set out in the analysis of the structure of the proposed scheme, can ensure the achievement of an ecological and economic optimum. The final effect of implementing digitalization of monitoring of crop production is in contribution to achieving climate neutrality, but also to solving a higher-level problem - the transition to an environmentally friendly economy. These aspects determine the novelty of the proposed approach, which can play a positive role in the implementation of environmentally stabilizing programs and strategies formed by politicians and decision-makers.

Keywords: Environmental And Economic Efficiency, Commodity Crops, Eco-logical Neutrality of Agricultural, Natural Resource Potential, Domestic (Volun-tary) Carbon Market, Soil Pool.

Assessing Climate and Economic Risks to Food Security in Europe: A Multiscenario and Lag-Based Modelling Approach

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Abstract

This study presents a multi-scenario assessment of climate and economic risks affecting food security in seven European countries (Ukraine, Poland, Spain, France, the Netherlands, Italy, and Hungary). The conceptual framework follows the vulnerability–resilience paradigm, considering food system resilience as a function of exposure, sensitivity, and adaptive capacity. Although food security has been widely studied, the literature rarely quantifies delayed effects under compound risk scenarios, highlighting a gap in multifactorial modelling approaches. The study introduces a methodological contribution by integrating dynamic lag modelling with Monte Carlo simulations to assess short- and long-term effects of climate and economic risks on food security in Europe. The analytical approach comprises composite risk index construction using Principal Component Analysis (PCA), a distributed lag model, and a 10,000-iteration simulation procedure. Data were compiled from FAO, OECD, Economist Impact, Eurostat, and EEA open-access sources. The results reveal significant spatial heterogeneity in risk exposure: Ukraine (72%), Hungary (68%), and Poland (61%) show the highest probability of exceeding the critical food insecurity threshold (index < 0.3), while the Netherlands exhibits a much lower probability (19%). The combined scenario amplifies adverse effects and indicates a heightened risk of systemic instability. The methodological novelty lies in the integration of lagged econometric modelling and scenario-based simulation, enabling simultaneous temporal and spatial analysis. The findings underscore the need for adaptive, regionally targeted food security policies that consider both cumulative and delayed responses to external shocks.

Keywords: Food Security, Climate Risks, Economic Vulnerability, Scenario Analysis, Distributed Lag Model, Monte Carlo Simulation.

Strategic Mechanisms for Managing Sustainable Development Hospitality Industry in Ukraine

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Abstract

Against the backdrop of martial law and a recovery-driven economy, the study of sustainable development principles and corporate responsibility within the hospitality industry has gained particular relevance). These dimensions are critical determinants of the industry's competitiveness, aligning with global trends in business greening, social accountability, ethical consumption, and digital transformation. Considering the unique operational context of Ukraine's hospitality sector, examining international best practices and modern digital and technological trends becomes vital for establishing effective recovery mechanisms and long-term sustainability. A comprehensive analysis of the domestic hospitality industry in light of global and EU integration trends enabled the identification of strategic mechanisms to enhance the resilience, efficiency, and international competitiveness of Ukrainian hospitality enterprises. The study emphasizes the practical implementation of ESG principles, synergy of digital technologies, intelligent control systems, and social inclusion as foundational elements of contemporary management strategies. Key development priorities include ecologically driven infrastructure reintegration, socially responsible restructuring of human capital, and resource-efficient technological modernization. The article also highlights the harmonization of the regulatory framework with EU directives, implementation of smart solutions, digital monitoring tools, the adoption of intelligent management systems, grant-based support for sustainable initiatives, and the adaption business models to circular economy principles.

Keywords: EU integration, ESG principles, corporate responsibility, digital transformation, hospitality industry.

Principles of Building a Healthy Diet in Modern Industrial Pig Farming

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Abstract

Excessive differentiation of pigs by meat qualities corresponds to well-defined genetic data and has led to a weakening of the constitution. The heart has become relatively small, the blood volume is large with a thick consistency, the hypothalamus is underdeveloped, the thermoregulation mechanism is not well-established, and the limbs are very weak. Intensive breeding of such pig breeds under the conditions of industrial technology implementation coincides with the most powerful negative impact on mental sensitivity and a tendency to herd hysteria. Among the main reasons for the decrease in adaptation to the microclimate of pig keeping, experts highlight: 1) the need to optimize pregnancy, 2) early weaning of piglets from maternal nutrition, 3) the formation of very large groups of piglets (more than a thousand) for growing and fattening, 4) transportation of animals, which causes a stressful state, which is accompanied by a decrease in the quality of meat products. The biochemical basis of the emotional stress response of animals is oxidative stress, which can be counteracted with the help of the powerful antioxidant chitin-glucan-melanin complex from the tinder fungus F. fomentarius (CHMC). At the same time, CHMC has an aseptic mechanism of action. Unlike antibiotics, it is not toxic to the host cells and is simultaneously aimed at overcoming non-infectious diseases by binding the detritus of the body's own tissues, mediators of the general inflammatory reaction, free radicals, in particular reactive oxygen species, nitrogen, etc. The introduction of CHMC into feed mixtures reduces signs of stress reaction, has a positive effect on the blood system, excretory system and immunity. The result of such a policy is an improvement in the health of the studied pigs, an increase in the quality and reduction in the cost of meat obtained from them.

Keywords: Fomes fomentarius, Chitin, Glucan, Melanin, glucan-melanin complex.

Ecological Protection of Plants Using Biological Products from the Basidiomycete Fungus Fomes Fomentarius

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Abstract

The constant use of pesticides and mineral fertilizers, which destroy biological diversity in the soil, reduce the humus content and lead to a decrease in the yield of plants (corn, soybeans, rice, wheat) with the most valuable consumer properties and high susceptibility to diseases.

The effectiveness of the best resistance-inducing drugs reaches only 60-80% of the effectiveness of biocidal drugs. But they are not toxic, do not have a detrimental effect on the ecological system, are safe for humans (they do not have residual amounts of toxic chemicals in the product), increase immunity to pathogens, and increase resistance to drought, cold, temperature changes, and pests.

Only the successful provision of the world's population with a quality product depends on the development of organic farming, which involves the use of only natural means to combat plant pests. Therefore, the main focus of our work was on testing a plant resistance inducer of an aqueous extract of the glucan-melanin complex (GMC) of the cell wall of the basidiomycete fungus Fomes fomentarius called mikosan, which exhibits powerful antioxidant, antibacterial, fungicidal, and antiviral activities. It is GMC that induces plant resistance to diseases by enhancing the synthesis of enzymes to resist infection and switching some metabolic reactions from the biosynthesis of constitutive metabolic compounds to the synthesis of phytoalexins and other antipathogenic substances.

Mikosan underwent a full program of laboratory, small-scale, field industrial tests on many agricultural crops in different climatic zones of Ukraine, as well as toxicological studies, starting in 1998. It belongs to the fourth, lowest category of toxicity registered in Ukraine at the beginning of 2002.

Keywords: Plant protection, Plant resistance, Resistance inducer, Biological products, Glucans, Melanins.

Integrating Digital Technologies into the Design of Ejection Carbonization Systems to Reduce Greenhouse Emissions

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Abstract

Industrial carbon dioxide (CO_2) emissions from sugar factories are significant in volume and need to be urgently reduced. The analysis of possible strategies for minimizing the anthropogenic impact on the environment indicates the feasibility of modernizing the first and second carbonization equipment. In particular, installing ejection devices with a dispersed jet of liquid in the suprajuice space of carbonizers is promising. This approach to modernizing devices allows not only to reduce CO_2 emissions by 20%, but also to increase the efficiency of purifying diffusion juice from unwanted. Computer modeling was key in designing and optimizing the proposed technical solution. The flow dynamics and the efficiency of phase mass transfer in various configurations of ejection devices were simulated using CFD analysis. This made it possible to determine the optimal parameters of the active nozzle and ensure a uniform distribution of the gas phase in the reaction volume.The results of experimental studies indicate a significant dependence of the volumetric ejection coefficient on the design of the active nozzle. The highest value of the ejection coefficient, up to 7, is achieved by using an innovative centrifugal-jet nozzle with open supply channels inclined to the nozzle axis at a nominal liquid supply pressure of 0.2 MPa.

Keywords: Industrial Emissions, Carbonizer, Sugar İndustry, Ejector, Nozzle, Absorption, Modelling.

Institutional Mechanisms of Digital Transformation of Accounting and Control in Agribusiness

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Abstract

This article analyses the institutional foundations of digitalising the accounting and control systems in the agricultural sector, considering the current challenges of digital-isation and the growing demand for effective management. It considers the essence and specifics of establishing an institutional framework for integrating digital tech-nologies into the accounting practices of agricultural enterprises. The article highlights the key structural components of this mechanism, its functional characteristics, and its internal connections. The results of research into the impact of digital tools on the transformation of accounting processes are introduced into scientific circulation, focusing on the automation of the collection, processing, transmission and analysis of financial and economic information. Key obstacles to digitalisation have been identified, including a lack of regulatory and legal framework, low digital competence among personnel, and limited access to infrastructure. The potential benefits of digi-tally transforming accounting and control procedures in agribusiness are substantiat-ed, including reduced accounting costs, enhanced control over resource usage, in-creased management decision transparency, and improved financial reporting quali-ty. Strategic directions for strengthening the institutional environment to support digi-tal initiatives are proposed, including updating the regulatory framework, investing in digital infrastructure, improving specialist qualifications, and developing public–private partnerships in agri-digitalisation. The results obtained have both scientific and practical value. They can inform state policy on the digital development of the agricultural sector, as well as the modernisation of accounting systems in agricultural enterprises in line with the requirements of the digital economy.

Keywords: Accounting, Digital Transformation, Institutional Mechanism, Agribusi-Ness, Agricultural Sector, Control, Audit, Enterprise Accounting System.

Do Farmers Matter to Agri-input Companies? A Quantitative Evaluation of CSR Stakeholder Prioritization in India

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Abstract

The extensive literature on CSR and stakeholder theory strongly pitches for companies to focus their CSR efforts on relevant stakeholders. From both strategic instrumental and normative altruistic perspectives, Agri- input companies are expected to prioritize farmers as a relevant stakeholder for their CSR intervention. This study, using the data on CSR expenditure reported by Agri-Input companies in their annual reports, investigates the priority accorded to farmers in their CSR interventions. We use proportion of expenditure by the companies on farmer centric projects as a reflective indicator of significance of farmer and run T test and regression analysis as tools to test the hypothesis. Contrary to the expectations, our findings suggest that farmers or farmer related interventions are not a priority for Agri- Inputs companies in India. These finding counter the proposition that Indian CSR is moving from charity to strategic CSR and also emphasizes the need for policy interventions to direct CSR expenditure on areas identified as a national priority.

Keywords: Agri-Input, CSR, Stakeholder, Farmers, Strategic CSR.

Quantifying Agricultural Losses in Ukraine: A Data-Driven Approach to War-Induced Land Damage

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Abstract

The Russian invasion of Ukraine has caused unprecedented damage to the country's agricultural sector, resulting in severe economic losses, land degradation and disruption to food systems. This study presents a comprehensive methodology for assessing agricultural losses induced by war, combining remote sensing, GIS, machine learning and economic modelling in an integrated approach. Through the analysis of satellite imagery and NDVI indices, we are identifying and classifying areas of damage, estimating direct income losses and quantifying indirect effects, such as the loss of soil fertility and disruption to crop rotation. We have developed a relational database and interactive platform to support real-time damage assessment and policy decision-making. We applied the methodology in a case study of the Velykopysarivska Rural Council, which demonstrated substantial economic losses from uncultivated land. This study provides actionable insights for recovery planning, infrastructure rehabilitation and targeted support, thereby contributing to Ukraine's long-term agricultural resilience and global food security.

Keywords: Ukraine, War-Induced Losses, Agriculture, Remote Sensing, GIS, Land Degradation, Crop Productivity, Recovery Planning, Food Security.

SP01: Management, Policy, and Sustainability in Education, Healthcare, and Enterprises

Developing Students' Critical Thinking through the Analysis of Foreign Policy and the Use of Information and Analytical Tools

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Abstract

The article examines the issue of fostering critical thinking in bachelor's degree students through studying the disciplines «Foreign Policy of Post-Soviet Coun-tries» and «Information and Analytical Activities» within the «International Rela-tions, Public Communications, and Regional Studies» program, emphasizing the analytical potential of new independent states. Amidst modern challenges, includ-ing the Russo-Ukrainian war, information warfare, political polarization, and global instability, critical thinking emerges as a key competency. The authors ar-gue that analyzing political processes in the post-Soviet space, including phenom-ena like war, frozen conflicts, hybrid aggression, authoritarianism, and identity transformations, creates a unique environment for developing analytical thinking, source evaluation skills, narrative comparison, and forming well-reasoned posi-tions. The post-Soviet space, with its complex historical legacy, geopolitical ten-sions, and diverse state-building models, serves as a valuable foundation for stu-dents' research. Its multidimensionality fosters a holistic understanding of con-temporary international politics and prepares future professionals to operate amidst information instability. The article highlights the theoretical foundations of critical thinking, educational methods for its development (case studies, simula-tions, primary source analysis, reflective practices), and assesses its impact on students' professional development and active civic engagement. The potential of post-Soviet countries as a multifaceted research subject for fostering critical thinking is explored.

Keywords: International Relations, Foreign Policy, Post-Soviet Space, Histori-cal-Analytical Activities, Critical Thinking, Information Warfare, Disinformation.

Integrated Queueing-Inventory Models: A Comprehensive Literature Review and New Thematic Classification

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Abstract

The application of queueing systems in inventory models has increased in recent years, enabling more precise evaluations of related issues. This trend reflects the critical importance of managing inventory alongside the queues formed by demand, which significantly impacts inventory systems. This article presents a comprehensive literature review on the integration of queueing theory into inventory models. Drawing from existing review studies, key characteristics were identified, with each queue-inventory study exhibiting one or more of these features. A new thematic classification is then proposed based on these characteristics, accompanied by a summary of the relevant studies within each category. Furthermore, the objectives and solution approaches employed in several studies are discussed. The article concludes with a summary of key findings and an outline of future research challenges.

Keywords: Queueing Systems, Inventory Models, Ordering Policies, Stochastic Processes, Steady-State Analysis, New Thematic Classification.

Exploring Macro-Level Challenges in Health Tourism Development in Iran: Insights for Emerging Destinations

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Abstract

As a convergence of healthcare and travel, health tourism has emerged as a crucial industry, particularly for the sustainable development of destinations in developing countries. This sector not only drives economic growth but also enhances healthcare services, infrastructure, and international collaboration. Iran, endowed with abundant natural and medical resources, represents a highly promising destination for health tourism. The country offers a diverse range of landscapes, including natural hot springs, mineral-rich spas, and various climatic conditions, all of which contribute to wellness and recovery. Concurrently, Iran is recognized for its advanced medical technologies and highly skilled healthcare professionals, providing high-quality medical services at competitive costs. These advantages, combined with Iran's strategic geographical position, underscore its potential as a leading health tourism destination, attracting international patients seeking both medical treatments and natural therapeutic experiences. Despite these strengths, Iran has yet to fully realize its potential in the health tourism sector. This study, therefore, seeks to examine and identify the key challenges hindering its development. To this end, 21 semi-structured interviews were conducted with key stakeholders, including policymakers, healthcare professionals, and industry experts. The collected data were analyzed using thematic analysis, leading to the identification of five principal themes and 25 sub-themes. The main challenges identified include deficiencies in integrated governance, infrastructural limitations, the need for education and capacity building, weaknesses in marketing and promotional strategies, and constraints in international relations. Addressing these challenges is not only imperative for Iran but also holds significant implications for other emerging and developing countries within the health tourism sector. By overcoming these obstacles, countries can enhance their global competitiveness, attract a greater number of international patients, and foster the sustainable growth of this expanding industry.

Keywords: Health Tourism, Tourism Development, Iran, Emerging Destinations.

Routing for a Sustainable Future: A Systematic Review of Routing and Scheduling Problems in Home (Health)-Care Logistics

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Abstract

Basically, Home (Health)-Care organizations offer a big variety of medical and non-medical services to patients in their own homes. These services are designed to deliver high-quality care in comparison with the hospital environment. This research paper aims to enact a systematic literature review (SLR) on Home (Health)-Care operations that exhibit routing and scheduling problem. Within this framework, we applied an exhaustive methodology that thoroughly assesses, analyzes, and summarizes the existing literature related to the Home (Health)-Care Routing and Scheduling Problem (HHCRSP). We invested international databases (like Web of Science, Google Scholar, Springer, and Scopus) for systematic searches in order to collect papers within the scope of our research area. We focused on theoretical and real-case articles that were published in English from 2014 onwards. We equally developed other criteria to guide the selection of studies and the data charting process. Regarding the classification of selected articles, our emphasis extends not only to the objectives, constraints, and resolution methodologies used in research works but also to the dimensions (like economic, social, and/or environmental aspects). All relevant aspects of this issue play a crucial role in making scenarios more realistic. This comprehensive literature review serves as a valuable resource for identifying numerous directions for future research, as presented in the concluding section of this paper. It grants authors the opportunity to discover unexplored challenges and opt for research methodologies aligned with specific limitations and objectives in the scope of home-based care.

Keywords: SLR, Home (Health)-Care, HHCRSP, Aspects.

Scheduling of Pilot and Cabin Crew Training in Aviation

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Abstract

Training planning is a critical operational task in aviation, since safety regulations and operational continuity require pilots and cabin crew to complete specific theoretical and practical training programs. This study addresses the complex problem of jointly training planning for heterogeneous groups of pilots and cabin crew at a training center of an aviation company. We formulate this problem as a mixed integer programming (MIP) model that assigns groups to time slots, classes, and practical training stations, accommodating resource capacities, equipment compatibility, task constraints, and daily training hour limitations. Two different training modes are modeled: theoretical sessions assigned to a single group within each class, and practical sessions where multiple groups can be trained simultaneously if capacity permits. Unlike most studies that focus on pilots or cabin crew separately, this study schedules both together, reflecting dependencies for shared resources. Furthermore, while many previous studies minimize total training time or cost, we propose a dual-objective: (1) maximize the availability of practical training resources (enabling the center to accommodate external trainees) and (2) minimize the number of training days per group to increase efficiency. A real-world case study from an aviation company is used to validate the model. The model is implemented in GAMS and integrated with a Python-based interface to get the solutions. The results demonstrate full compliance with the constraints in the model, increased utilization of practical facilities, and a more compact training program compared to the company's manual planning approach. This study proves that advanced optimization techniques can significantly improve training resource management in aviation, supporting both operational and strategic objectives.

Keywords: Training Scheduling, Aviation Training, Operations Research In Aviation, Timetabling, Cabin Crew and Pilot Training.

ESG Implementation Costs: Optional Expenditure or Essential Commitment? The Case of PPC

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Abstract

This study analyzes PPC's adoption of social responsibility programs, the rising transparency and accountability management programs in the organization, as well as investments in renewable energy in light of the ESG criteria. It explores whether the financial burdens of implementing social responsibility programs and investments in transparency and accountability will yield returns. The research although recognizes the short-term challenges of out sized balancing operational costs in a fast changing highly competitive, and heavily regulated energy sector. Sustainability is no longer a voluntary endeavor, and in the case of PPC, ESG focuses on an organization's environmental impact, pursuing the more social responsibility associated with climate change, and governance structure. The research still underscores the long-term upside: marketing value, corporate reputation rehabilitation, trust, stakeholder goodwill, ESG mandated compliance, and better stability.

Keywords: ESG, Accounting, financial Statements, Financial Accounting, Auditing, Business Ethic.

SP02: Safety and Reliability Engineering, System Engineering, and System Safety in Industry 4.0

SP02: Safety and Reliability Engineering, System Engineering, and System Safety in Industry 4.0

A Review of Human Reliability Analysis Techniques in Oil and Gas Industries

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Abstract

This paper reviews prominent techniques in Human Reliability Analysis (HRA) as applied to the oil and gas industry. HRA represents a systematic approach for evaluating the probability and impact of human error on operational safety. The review draws upon a number of methodologies including THERP, SPAR-H, HEART, and emerging model-based frameworks, with particular attention paid to adaptations specific to petroleum applications such as the Petro-HRA method. Synthesizing insights from technical briefing notes, narrative reviews, historical accounts, and retrospective case studies, the discussion highlights the underlying concepts, error-producing conditions, performance shaping factors, and the quantitative estimation of error probabilities. The implications for safety management in high-risk oil and gas environments are discussed alongside limitations inherent in the current methods and avenues for future methodological improvement. The results indicate that while classical techniques such as THERP and HEART continue to provide a foundational understanding, newer frameworks like SPAR-H and model-based approaches—epitomized by the Petro-HRA Project and recent retrospective applications—offer improved contextual integration and better predictive power for industry-specific incidents. Overall, this review underscores the importance of HRA in proactive risk management and accident prevention within the oil and gas sector.

Keywords: Human Reliability Analysis (HRA), Oil and Gas Industries, Proactive Risk Management, Accident Prevention.

Assessment of Occupational Health and Safety Risks in Oil and Natural Gas Drilling Operations with Multi-Criteria Decision Making (MCDM) Methods

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Abstract

Petroleum and natural gas drilling operations involve complex and hazardous processes, posing a high level of occupational health and safety (OHS) risks. This study aims to systematically identify, prioritize, and propose appropriate control strategies for these risks by applying Multi-Criteria Decision-Making (MCDM) methods. Based on the criteria weights determined using the Analytical Hierarchy Process (AHP), the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) was employed to rank the risk factors, and the VIšekriterijumsko KOmpromisno Rangiranje (VIKOR) method was used to evaluate the most suitable preventive measures. The findings reveal that operational accidents and high-severity risks such as explosions and fires are of prima-ry concern. While engineering controls emerged as the most effective solutions, complementary technological and organizational strategies such as automation, drilling well control systems, training programs, and emergency management controls were also recommended. The study highlights the necessity of adopting a proactive and risk-based approach to OHS management, with an emphasis on continuous improvement and enhanced worker participation.

Keywords: Multi-Criteria Decision-Making Methods, Occupational Health and Safety, Risks and Preventive Measures, Petroleum and Natural Gas Drilling Operation.

Explainable Reinforcement Learning in Autonomous Navigation Systems

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Abstract

Autonomous navigation systems, such as self-driving cars and drones, increas ingly rely on reinforcement learning (RL) to make complex decisions in dynamic environments. However, the opaque nature of RL policies often hinders trust, safety assurance, and regulatory approval. This paper investigates explainable reinforcement learning approaches tailored for autonomous navigation, aiming to enhance transparency without compromising performance. We explore inter pretable policy architectures alongside post-hoc explanation techniques that translate RL decisions into human-understandable forms, such as visualiza tions and natural language justifications. Additionally, we propose incorporating human-in-the-loop methods to refine policies based on user feedback and improve ethical decision-making. Our framework is evaluated on navigation tasks involv ing obstacle avoidance, dynamic route planning, and emergency maneuvers. Results demonstrate that explainability improves user trust and aids in diag nosing failures while maintaining navigation efficiency and safety. This research provides a crucial step toward deploying autonomous systems that are not only intelligent but also accountable and reliable in real-world scenarios.

Keywords: Explainable Artificial Intelligence (XAI), Reinforcement Learning (RL), Autonomous Navigation, Human-in-the-Loop, Safety and Transparency in AI.

Assessment of the Impact of Financial Regulation on the Design of Industrial Facilities Regarding Environmental Issues Using Digital Technologies

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Abstract

The article uses the example of the Kyiv Vitamin Plant to investigate the integra-tion of environmental standards into urban planning as a key stage in ensuring the sustainable development of industrial facilities in the pharmaceutical industry. Environmental problems associated with the construction and operation of such facilities in urban agglomerations are analyzed, in particular their impact on air quality, water resources, soils, noise levels, and waste management. An approach to assessing the environmental safety of industrial construction using modern technologies to minimize negative impacts is proposed. The authors propose a variant of calculating compensation for environmental damage through an envi-ronmental tax in accordance with the legislation of Ukraine, analyze the method-ology for calculating payments for emissions of pollutants by stationary sources, and assess the impact of pharmaceutical enterprises and transport on air pollution. Recommendations are formulated for rational spatial planning, financial regula-tion, and the implementation of environmentally sustainable practices in industry. The proposed measures are aimed at reducing the impact of industry on the envi-ronment and supporting the sustainable development of the urban environment in the context of digital transformation

Keywords: Sustainable urban development, land resources, environmental standards, environmental safety, urban planning, spatial planning.

A Comparative Study of Wi-Fi, Cellular, and Satellite Internet Technologies: Performance, Accessibility, and Real-World Applications

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Abstract

In today's hyper-connected world, internet access has become a fundamental necessity, powering everything from communication to commerce. This paper presents a comparative analysis of three major internet technologies: Wi-Fi, cellular internet, and satellite internet. While each serves the same purpose—enabling connectivity—they differ significantly in terms of infrastructure, coverage, speed, latency, cost, and reliability. Wi-Fi, typically used in local networks, offers high-speed connectivity within a limited range and is ideal for homes and offices. Cellular internet, delivered via mobile networks, provides broader coverage and is well-suited for on-the-go access, but may face congestion issues in densely populated areas. Satellite internet, on the other hand, is often the only option in remote or rural areas, though it comes with higher latency and weather-related disruptions. This paper humanizes the technology by exploring real-world scenarios where each type shines or struggles, helping readers understand not just the technical aspects, but also the practical implications. Through this comparison, we aim to offer a clearer perspective on the strengths and limitations of each technology, empowering users, policymakers, and businesses to make informed decisions based on their specific needs and circumstances.

Keywords: WiFi, Cellular Communication, 4G/5G, Satellite Communications.

SP03: Data Science and Knowledge Management in Engineering Management

Enhancing Data Security and Privacy Using Federated Learning: A Scalable Framework for Distributed Systems

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Abstract

The rapid proliferation of distributed systems, Internet of Things (IoT) devices, and cloud-based services has introduced unprecedented challenges to data securi-ty and privacy. Traditional centralized approaches to data protection often struggle to balance security, scalability, and efficiency, particularly when sensitive data is involved. This paper proposes a federated learning-based framework to enhance data security and privacy across distributed environments. By enabling local model training on edge devices without transmitting raw data to centralized serv-ers, the framework significantly reduces privacy risks and potential attack surfac-es. We present the architecture, key components, and security mechanisms em-bedded in the framework, including secure aggregation, differential privacy, and homomorphic encryption. Extensive experiments were conducted on benchmark datasets to evaluate the framework's performance in terms of accuracy, commu-nication overhead, and resilience against adversarial attacks. The results demon-strate that the proposed approach not only preserves privacy but also achieves competitive predictive performance compared to traditional centralized models. This work contributes a scalable and practical solution to address the evolving demands of secure and privacy-preserving machine learning in real-world dis-tributed applications.

Keywords: Data security, Privacy preservation, Federated learning, Distributed systems, Secure aggregation, Differential privacy, Homomorphic encryption, In-ternet of Things (IoT), Machine learning security, Adversarial robustness.

Social Media as a Space of Information

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Abstract

This article is devoted to the issue of social media as a space for information warfare. Information warfare, treated as a component of hybrid warfare, can determine the success or failure of a given political or military undertaking. The struggles in the noosphere have recently encompassed new, previously unknown spaces, among which social media appear to be key. The aim of the considerations is to demonstrate that social media are currently the main platform of struggle in the infosphere, and therefore the main cognitive battlefield. In addition, the basic tools for conducting information warfare in social media will be indicated, as well as ways to counteract information attacks in the designated space. The entire discussion ends with conclusions, the implementation of which may contribute to increasing the resilience of the state, and consequently society, to the actions of an info-aggressor. The work uses the literary studies method as its leading method, with the historical and dogmatic methods used as auxiliary methods.

Keywords: Social Media, Deep Fake, Fake News, Information Warfare, State Security.

Comparative Analysis of Mental Workload of Academic Staff and Physicians with CarMen-Q Method

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Abstract

Mental workload is defined as an indicator of the balance between the com-plexity of a task and the individual's capacity to perform that task. In today's professional groups, measuring mental workload accurately is of critical im-portance for both the sustainability of performance and the prevention of professional burnout. This study aimed to comparatively analyze the mental workload of faculty members and physicians. The CarMen-Q Mental Work-load Scale, a total of 29 items developed by Rubio et al. (2017) and consist-ing of four sub-dimensions: cognitive workload, temporary workload, per-formance-related workload, and emotional workload, was used as the data collection tool in the study. In the evaluation conducted for faculty mem-bers, the highest mean score in the 50-person sample group was determined in the cognitive workload sub-dimension, while the lowest mean score was determined in the temporary workload sub-dimension. In the physician group, in the analysis conducted on a sample of 50 specialists and general practitioners, the highest performance-related workload was determined, and the lowest temporary workload was determined as the sub-dimension. The fact that the temporary workload dimension is low in both occupational groups indicates the effect of task continuity and professional experience in alleviating mental load. However, the fact that cognitive demands are more pronounced in academicians and performance-oriented pressures are more pronounced in physicians reveals that the mental workload profiles of the two occupational groups differ in terms of work environment, decision-making processes and areas of responsibility. This study is an exemplary ap-plication in which the mental workloads of academicians and physicians are comparatively evaluated with the CarMen-Q method. The findings obtained indicate the need to develop strategies to reduce mental workload specific to occupational groups.

Keywords: Ergonomics, Mental Workload, CarMen-Q.

Organizational Resilience Measurement and Development Approaches at an Energy Production Company in Türkiye

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Abstract

Organizational resilience has strategic importance in terms of preserving the abil-ity of institutions to adapt and sustain themselves in times of uncertainty and cri-sis. In this study, the resilience levels of human resources, investment, quality and operations departments within the company that serve in the renewable ener-gy sector are analyzed by considering the dynamics specific to the sector. The aim of the study is to determine the resilience levels of the departments and to make strategic inferences to increase the organizational resilience of the company. With-in the scope of the study, organizational resilience was measured with survey questions determined under five factors and data were obtained with a survey ap-plied to employees working in the institution. The reliability of the survey was evaluated with the Croanbach Alpha coefficient, and Kaiser-Meyer-Olkin and Barlett tests were applied to determine the suitability of the data for analysis. Up-on conformity of the test results, the weights of the factors were determined with Confirmatory Factor Analysis. Using the obtained factor weights, Resilience In-dex Measurement and Analysis (RIMA) scores were calculated to analyze the opinions of the survey participants about the resilience of the organization. The RIMA scores were computed using Python-based tools, including pandas, factor analyzer, and semopy for data processing, factor analysis, and confirmatory fac-tor analysis. In addition, Business Impact Analysis was performed with factor weights and survey data, and thus the resilience levels of the departments were determined. As a result of these analyses, the strengths and weaknesses of the organization were revealed, and it was determined in which areas of improvement were needed.

Keywords: Organizational Resilience, Energy Sector, Strategic Planning.

A Privacy-Compliant Blockchain-NLP System for Predictive Employment Agreement Management

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Abstract

As digital transformation continues to reshape organizational processes, the management of employment contracts in human resources departments remains predominantly manual, document-centric, and operationally fragmented. This conventional model introduces significant risks, including inefficiencies in contract execution, limited traceability, and challenges in ensuring legal compliance and consistency. To address these limitations, this study proposes a multi-layered digital contract management platform that integrates blockchain technology with advanced artificial intelligence (AI) components. Ethereum-based smart contracts are utilized to automate the execution of contract clauses, ensuring each transaction is securely timestamped and immutably recorded on a decentralized ledger. This guarantees the integrity and verifiability of all contractual interactions.

For content analysis, the system employs pre-trained transformer models—Legal-BERT and BERTurk—tailored to the Turkish legal domain. These models enable semantic classification of clauses, detection of missing provisions, and evaluation of language coherence. Complementing this, supervised learning algorithms such as XGBoost and Random Forest are used to predict the likelihood of clause-level contract violations, providing real-time risk insights to users.

Experimental results based on annotated Turkish employment contracts indicate that the system achieves over 87% accuracy in identifying risky clauses and over 82% in detecting incomplete provisions. All data operations are secured using AES-256 encryption and managed in full compliance with GDPR and KVKK standards.

By combining AI-based legal reasoning, blockchain-backed immutability, and real-time risk analytics, this platform offers a transformative approach to employment contract governance. It enhances operational transparency, reduces administrative overhead, and improves legal reliability—representing a scalable and multidisciplinary innovation at the intersection of artificial intelligence, legal informatics, and distributed systems [8].

Keywords: Blockchain-Based Contract Systems, Smart Contracts, Legal Natural Language Pro-Cessing (Legal NLP), Predictive Compliance Analytics, Employment Agreement Au-Tomation, AI-Powered Legal Risk Assessment, Legal Informatics, GDPR and KVKK Compliance, Decentralized Legal Infrastructure.

SP04: Emerging Technologies for Sustainable Development

The 21st Century University's Mission: Globalization's Challenges and Ukraine's Prospects

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Abstract

The article is dedicated to the exploration of the mission of the 21st-century university within the context of globalization's challenges and the prospects for Ukraine. The research is grounded in the application of theoretical methods of scientific inquiry, including abstraction, analysis, synthesis, generalization, and comparison, alongside an examination of current regulatory documents at both international and national levels, as well as scholarly publications. The aim of the article is to delineate the mission of the 21st-century university. An analysis of contemporary trends in the development of higher education has facilitated the substantiation of shifts in the educational paradigm. Particular attention has been devoted to outlining the evolving mission of the Ukrainian university within the context of Ukraine's establishment as an equal member of the European community, which entails the achievement of several objectives: ensuring competitiveness and social responsibility that commands high public trust; cultivating the nation's professional, academic, and educational potential through the implementation of high-quality educational programs, research endeavors, and social projects; fostering integration into the European educational and research area; promoting the development of institutions and academic communities based on the principles of academic freedom, university autonomy, integrity, and inclusivity. The originality of this study resides in its endeavor to synthesize extant international and national frameworks regulating the education sector, coupled with scholarly inquiries into educational paradigms in order to formulate a cohesive understanding of the mission of modern universities. This understanding integrates the multifaceted spectrum of reformative and modernization initiatives directed toward the advancement of higher education in Ukraine. The article is addressed to educators, students, and researchers, with the objective of emphasizing the paramount significance of educational considerations.

Keywords: Globalization, Higher Education, University Mission, Education Applicants, Vocational Training, Competency-Based Education, Future Specialists.

Analysis and Forecasting of Land Use Changes Using QGIS

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Abstract

Land use planning in the context of climate change, post-war reconstruction and accession to European Union standards depends on reliable methods for predict-ing land use change. Using a significant amount of multi-temporal satellite data collected over a 7-year period from 2017 to 2023, we investigated the changes in land classes from one spatial and temporal transition state to the next and to a fu-ture land use model. The MOLUSCE plug-in in QGIS used the following correc-tive (contextual) factors: digital elevation model (DEM), slope map, map of prox-imity to roads. Neural networks were used to calculate the forecast model. During the previous seven years, the area of different land uses had insignificant fluctua-tions, which indicates the relative stability of the territory. The classification data was verified using the Forest Plantation Plans of the educational and research forestry and information from the Public Cadastral Map. In the future, climate change may lead to a decrease in water levels, while the ability of ecosystems to self-regulate and the implementation of afforestation plans may increase the area covered by trees. For successful land management, urban planning and sustaina-ble development, it is necessary to accurately predict trends in the structure of land. The lack of open sources of planned land use data (strategies, concepts, pro-jects, etc.) makes it difficult to forecast the land use.

Keywords: Land use change, Climate change, Predictive modeling.

Addressing Technical Challenges and Workflow Optimization in 3D Prototype Manufacturing with Creality Ender 3 V2 Neo

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Abstract

This paper presents a comprehensive study on the optimization and technical refinement of fused-deposition-modeling (FDM) workflows using the Creality Ender 3 V2 Neo printer. Integrating two parallel research efforts, the work streamlines the additive-manufacturing pipeline through coordinated software–hardware calibration and parameter-driven experimentation. Industry-standard modeling tools (Maya, Blender, 3ds Max) were coupled with Meshmixer for mesh repair and Ultimaker Cura for slicing. Seven iterative trials with PLA filament evaluated layer height, infill topology, nozzle diameter and thermal settings to mitigate stringing, bevel distortion and adhesion faults. Representative case studies—a modular headphone stand and a telescope assembly—demonstrate how the optimized parameter set yields superior strength, surface finish and time efficiency versus default profiles. Findings establish a reproducible, low-cost workflow for desktop 3-D printing that is relevant to rapid prototyping and functional part fabrication.

Keywords: 3D Printing, Additive Manufacturing, FDM, Workflow Optimization, PLA Filament, Creality Ender 3 V2 Neo.

AI-Driven Threat Intelligence for Predictive Cyber Defense in Smart Cities

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Abstract

Smart cities are increasingly reliant on interconnected IoT devices and criti cal infrastructure, presenting a complex and expanding attack surface for cyber threats. Traditional cybersecurity approaches, often reactive and signature based, struggle to defend against advanced, evolving attacks such as zero-day exploits and polymorphic malware. This paper proposes an AI-driven threat intelligence framework designed for predictive cyber defense in smart urban envi ronments. Our system integrates federated learning for privacy-preserving data analysis, blockchain-secured data provenance for tamper-proof logs, and real-time anomaly detection to proactively identify and mitigate threats across municipal networks. By leveraging behavioral baselining and global threat intelligence feeds, the framework achieves high accuracy in detecting sophisticated attacks while ensuring ethical AI governance through explainable decision protocols. Validation across real-world smart city deployments demonstrates 99.47% threat detection accuracy and a 40% reduction in incident response times. The proposed solution addresses critical vulnerabilities in smart city infrastructure, balancing robust security with compliance and user trust, and sets a new standard for resilient, future-ready urban cybersecurity.

Keywords: AI-Driven Threat Intelligence, Predictive Cyber Defense, Smart City Security, Federated Learning, Zero-Day Attacks.

GreenCode: AI-Driven Energy Efficiency Optimization in Legacy Mainframe Systems

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Abstract

As the digital sustainability agenda becomes increasingly central to enterprise IT strategies, legacy mainframe systems pose a unique challenge. Despite their relia-bility and mission-critical roles, these systems often operate with suboptimal en-ergy efficiency due to outdated coding practices and architectural rigidity. In re-sponse to growing environmental and regulatory pressures, there is a critical need for intelligent tools that assess, optimize, and modernize legacy codebases from a sustainability perspective. This paper introduces GreenCode, a hybrid AI-powered framework designed to evaluate and enhance the energy efficiency of COBOL-based mainframe applications. The proposed system integrates static code analysis, rule-based diagnostics, and supervised machine learning to identify inefficient code patterns and recommend optimization strategies. By leveraging token-level feature extraction and historical energy profiling, GreenCode can quantify the energy impact of specific code blocks and suggest refactorings with measurable environmental gains. Experimental evaluation was conducted on a corpus of real-world COBOL programs, demonstrating that GreenCode's opti-mization suggestions can reduce estimated energy consumption by up to 24% in compute-intensive routines. The system also incorporates explainability mecha-nisms and a feedback loop for developer validation, ensuring transparency and trust in enterprise adoption scenarios. Furthermore, the proposed architecture aligns with emerging Green IT standards and offers compatibility with cloud-based modernization pipelines. Through this work, we contribute to the growing field of sustainable software engineering by targeting an often-overlooked do-main—mainframe computing. Our findings show that energy-aware refactoring is not only feasible but also essential in bridging the gap between legacy infra-structure and environmentally responsible IT transformation.

Keywords: Mainframe modernization, Green IT, COBOL optimization, Energy-efficient software, AI-assisted refactoring, Sustainable computing, Legacy systems, Static code analysis, Explainable AI, Software sustainability.

SP05: Machine Learning and Information Technology in Advancing Health, Business, and Environment

Human Papillomavirus Detection using Novel Machine Learning Algorithm Based on Cytology Images

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Abstract

Cervical cancer is among the most prevalent malignancies affecting women glob-ally and poses a significant threat to women's health. Predominantly caused by persistent infection with the Human Papillomavirus (HPV), this cancer can pro-gress silently through asymptomatic stages before becoming life-threatening. A primary diagnostic method for early detection is the Pap smear test, which in-volves collecting cervical cell samples to detect precancerous changes. However, manual interpretation of Pap smear images is prone to human error and places a considerable burden on healthcare systems. The application of Machine Learning (ML), particularly Convolutional Neural Networks (CNNs), has enabled more efficient and accurate analysis of cytological images. This paper explores the inte-gration of various ML methods to enhance diagnostic accuracy and speed in de-tecting cervical cancer and investigates the key challenges and prospects in this domain. Specifically, a hybrid approach combining CNN with algorithms such as K-Nearest Neighbors (K-NN), Decision Trees, and Support Vector Machines (SVM) is proposed. The study presents an advanced diagnostic pipeline that in-corporates radiomic feature extraction, stain normalization, Principal Component Analysis (PCA) for dimensionality reduction, and ensemble learning strategies. The proposed model demonstrated high performance, achieving 98.3% accuracy on the Herlev dataset and 97.5% on SIPaKMeD, outperforming traditional base-line models.

Keywords: Human Papillomavirus Detection, Machine Learning, Cytology Im-ages, Convolutional Neural Networks Introduction.

The Influence of Digital Transformation on Customer Loyalty in the Banking Sector: The Mediating Role of Customer Experience

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Abstract

This study examines the relationship between digital transformation and customer loyalty in the banking sector. The study addresses the issues of the impact of the introduction of advanced digital technologies on customers' loyalty intentions and whether these impacts are influenced by changing service experiences. The study adopted a quantitative research design, where data for the study was obtained from 255 respondents sampled from retail banking customers and analysed quan-titatively using Structural Equation Modelling (SEM) in SPSS and AMOS to test direct and indirect relationships between digital transformation, customer experi-ence and loyalty. The findings of the study revealed that digital transformation has a moderate positive influence on customer experience and customer loyalty. Moreover, customer experience substantially predicts loyalty and mediates the as-sociation between digital transformation and customer loyalty. Demographic fac-tors including gender, age and education are non-significant predicting factor of loyalty implying that, benefits of digital transformation and enhanced experiences are equal on all customer segments. The study is specific to retail banking in one national context and therefore may not be generalized to other regions or the fi-nancial service sector generally. Future departures from current research should include sectoral variations, longitudinal influences, and other mediating variables such as trust or perceived value to enrich the study of loyalty formation in digital context.

Keywords: Digital Transformation, Customer Experience, Customer Loyalty, Structural Equation Modelling, Banking.

Role of Information Technology in Advancing Sustainability in India: A Case Study Analysis

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Abstract

This study explores the role of information technology (IT) in advancing sustainability efforts across various sectors in India. As India pursues its commitment to the United Nations Sustainable Development Goals (SDGs), the integration of digital technologies into corporate sustainability strategies has become both imperative and challenging. Through an analysis of four Indian case studies, this research investigates how firms are leveraging technologies such as the Internet of Things (IoT), blockchain, and artificial intelligence (AI) to promote energy efficiency, resource optimization, and waste reduction. Findings indicate a growing trend towards green innovation, particularly in sectors like manufacturing, agriculture, and urban development. These technological interventions align with national frameworks such as the Digital India initiative and the National Action Plan on Climate Change (NAPCC), emphasizing the need for stronger digital infrastructure and skill development. Furthermore, the study underscores the importance of policy support, regulatory clarity, and public–private partnerships in fostering environmentally sustainable practices. The case studies exemplify how IT serves not only as a technological enabler but also as a strategic driver of sustainable transformation in India. Building institutional capacity and removing technological and financial barriers are critical to ensuring the scalability of these practices nationwide. Overall, the research highlights the transformative potential of IT in achieving India's sustainability goals through innovation, integration, and inclusive development.

Keywords: Information Technology, Environmental Sustainability, Digital Innovation, Sustainable Development, Green Accounting.

Smartwatch-Based Heart Rate Tracking

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Abstract

The integration of data from wearable electronic devices into computing environ-ments marks a significant step forward in digital healthcare and biometric data analysis. The Samsung Galaxy Watch, running on the WearOS operating system, is equipped with advanced sensors, including heart rate monitoring, enabling real-time health tracking. This study explores the design and implementation of a sys-tem for collecting and processing heart rate data from a smartwatch on a computer platform using modern software technologies. The proposed solution consists of two applications: one developed in Kotlin for WearOS, responsible for acquiring data from smartwatch sensors, and another written in Python, which facilitates communication between the smartwatch and the computer via an HTTP server. To ensure secure and efficient cloud storage, Firestore is employed, enabling rap-id data access. Additionally, the system includes tools for analyzing collected da-ta, such as heart rate trend visualization and CSV export for further processing. Potential applications span healthcare monitoring, fitness tracking, and other do-mains where biometric data plays a crucial role. The study also addresses chal-lenges and future directions, including enhancing measurement accuracy, expand-ing functionalities, and integrating support for a wider range of devices and plat-forms.

Keywords: Wearable devices, Smartwatches, Heart rate, Biometric data, Digital healthcare.

Enhancing Wine Fermentation: The Role of AI-Driven Predictive Modeling in Flavor Optimization

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Abstract

As the wine industry evolves toward greater precision and sustainability, Artifi-cial Intelligence (AI) has emerged as a transformative force in optimizing the fer-mentation process and enhancing flavor profiles. This paper explores the integra-tion of AI-driven predictive modeling in wine fermentation, emphasizing its role in improving flavor development, process automation, and quality assurance. Re-ferring to recent advancements in viticulture and enology, the paper highlights the application of hybrid AI systems—such as Multilayer Perceptron Neural Net-works (MLP-NNs) trained with Genetic Algorithms (GAs)—for predicting key fermentation variables like alcohol and substrate concentrations. Additionally, it reviews the effectiveness of various Machine Learning (ML) classifiers, notably Random Forest (RF) and Extreme Gradient Boosting (XGBoost), in forecasting wine quality based on physicochemical attributes, with RF achieving predictive accuracies as high as 93.01%. These models reduce reliance on manual measure-ments, enhance sensor longevity, and enable dynamic adjustments to fermentation conditions, supporting the creation of wines with targeted sensory characteristics. The findings underscore AI's growing role in flavor optimization, real-time pro-cess control, and data-informed decision-making in winemaking. By uniting ana-lytical rigor with technological innovation, AI-driven predictive modeling is poised to redefine fermentation management and elevate the sensory precision of modern wine production.

Keywords: Artificial Intelligence, Machine Learning, Wine Fermentation, Optimization, Sensory Prediction, Predictive Modeling.

Citizen-Centered Efficiency Assessment of European Smart Cities: A DEA Perspective

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Abstract

The increasing pace of urbanization imposes major challenges on cities in their pursuit of sustainable development. While technological innovations provide opportunities to enhance urban functionality, smart cities are expected not only to improve infrastructure and services but also to ensure social well-being, inclusiveness, and quality of life. In this context, efficiency emerges as a crucial dimension for evaluating how effectively cities transform available resources into socially sustainable outcomes. This paper applies Data Envelopment Analysis (DEA) to assess the efficiency of selected European smart cities, focusing on indicators that reflect accessibility to services, social equity, quality of life, and citizen engagement. DEA enables benchmarking by identifying best-performing cities and quantifying the relative inefficiency of others, thereby offering a nuanced view of how resources are converted into social sustainability outcomes. The results provide evidence-based insights into efficiency gaps among European smart cities and point to priority areas for policy improvement. By introducing a citizen-centered efficiency assessment, this study contributes to advancing the discourse on smart city performance evaluation and supports the design of strategies aimed at fostering socially sustainable urban development.

Keywords: Smart cities; Social Sustainability; Data Envelopment Analysis; Urban Efficiency; European Cities; Citizen-Centered Evaluation.

SP06: Marketing and E-Marketing for Resources Management

The Strategic Role of Information Systems in Modern Business: Empowering Decision-Making and Sustaining Competitive Advantage

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Abstract

In an era defined by digital transformation and rapid market evolution, Infor-mation Systems (IS) have emerged as a cornerstone of strategic management. This paper investigates the multifaceted role of IS in shaping strategic decisions and fostering sustainable competitive advantage within contemporary enterprises. Drawing upon an extensive review of academic literature, supported by insights from real-world case studies, the paper examines the strategic utility of systems such as Decision Support Systems (DSS), Enterprise Resource Planning (ERP), and Business Intelligence (BI). We present a conceptual framework that deline-ates how IS enhances managerial decision-making by improving information ac-curacy, operational agility, and strategic alignment. The analysis reveals that firms integrating IS into their core strategic architecture are better equipped to anticipate market trends, optimize resource allocation, and innovate continuously. The paper concludes by offering actionable recommendations for executives aiming to lev-erage IS as a strategic enabler, while also identifying key areas for future re-search. This contribution underscores the increasingly symbiotic relationship be-tween technological infrastructure and strategic leadership in the digital economy. The proposed conceptual framework distinguishes itself by integrating strategic dimensions of IS—namely decision-making, agility, and digital advantage—within a unified structure. Unlike prior models, it emphasizes the dynamic inter-actions between these factors in the context of rapidly evolving digital environ-ments, offering a novel lens for both researchers and practitioners.

Keywords: Information Systems, Strategic Decision-Making, Competitive Ad-vantage, Business Intelligence, Enterprise Resource Planning, Data-Driven Strate-gy

AI-Powered Search Engine Optimization-Friendly Content Generation: Enhancing Visibility and Impression

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Abstract

On digital real estate listing platforms, the visibility and engagement rate of list-ings depend mainly on the quality of search engine optimization-friendly content. High-quality content helps listing pages rank higher in search engine results, at-tracting more potential buyers or renters and increasing overall traffic to the plat-form. This study proposes an AI-based system that automatically generates search engine optimization-focused content for real estate listing pages. The de-veloped system comprehensively evaluates various contextual data of the region and listings, such as nearby schools, parks, and transportation options, and user-oriented filters, such as location, category, and ownership type. This sophisticated approach ensures that the generated content is highly relevant and informative for users. The AI agent produces rich, meaningful, and user-intent-aligned content specific to the region and category through large language models and information re-trieval-augmented generation techniques. Consequently, the implemented features of the system streamline the content creation workflow, enhance search engine rankings by incorporating relevant keywords and phrases, and drive organic traf-fic through improved search engine visibility. This leads to a more substantial online presence for real estate listing pages, drawing in more viewers and boost-ing the chances of successful deals. The generated content significantly improved the search engine optimization per-formance of listing pages in experiments conducted on real datasets. The findings reveal that the proposed method increases operational efficiency and improves the digital visibility of the platform. This agent-based approach offers a scalable solu-tion for the real estate sector and other sectors where data-driven content produc-tion is necessary.

Keywords: Content Generation, Search Engine Optimization, Large Language Models, Real Estate, Prop-tech, Retrieval Augmented Generation.

Study of the Relevance of the Use of Interactive Simulations for Teaching Students of Technical and Technological Specialties

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Abstract

Modern education is undergoing rapid transformation by adopting immersive and intelligent technologies. This study presents the design and evaluation of a web-based simulation platform tailored for technical and technological education. The platform integrates advanced features like interactive laboratory simulations, real-time analytics, and AI-powered personalization tools. A core focus is placed on its integration with existing MOOC (Massive open online course) infrastructures via RESTful (REpresentational State Transfer) APIs (Application Programming Interface), enabling seamless deployment within university curricula. The simula-tion environment leverages Unreal Engine 5 (UE5) to deliver high-fidelity virtual laboratories replicating physical settings and complex experimental processes in disciplines such as biochemistry, materials science, and software development. A mixed-methods research design was employed, including stakeholder needs anal-ysis, system prototyping, and pilot testing. Findings indicate improvements in student engagement, procedural fluency, and accessibility, with positive feedback on gamification and usability. Usability testing yielded a System Usability Scale score of 81.5, while pre/post-test assessments revealed a 28% average learning gain. The survey highlighted both interest in and institutional barriers to adopting such platforms. This study contributes to the digital and STEM education field by demonstrating how immersive, modular, and AI-enhanced platforms can com-plement or substitute face-to-face laboratory instruction while addressing peda-gogical and technical constraints in modern higher education environments.

Keywords: Immersive Learning, Virtual Laboratory, STEM Education Technol-ogy, Unreal Engine, Educational Simulation, AI in Education, MOOC Integra-tion, Gamified Learning, Web-based Learning Environments, Human-Computer Interaction in Education.

Noise Filtering in Simulated Temperature Rise Test Data of Transformers Using MATLAB

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Abstract

The temperature rise test is a fundamental evaluation to determine the ther-mal performance of power transformers, ensuring operational reliability and compliance with industry standards. This type test measures the steady-state temperature of transformer windings and oil under rated load conditions and gives us information about thermal behavior of transformer [1]- [4]. Howev-er, temperature sensors often introduce noise, affecting the accuracy of measured data. In this study, a MATLAB-based simulation of the tempera-ture rise test is developed to analyze transformer heating characteristics. Ad-ditionally, digital signal processing (DSP) techniques are applied to filter noise from sensor-measured temperatures, improving the precision of ther-mal assessment. The simulation model incorporates transformer characteris-tics, ambient conditions, and test mechanisms to achieve realistic temperature profiles. In this study we tried to model temperature rise test of a transformer with noisy temperature sensors. Then we tried to filter these noises to get clear waveforms. As the test will be carried out practically in our complementary study, the present work is expected to be beneficial in supporting that implementation.

Keywords: Transformer, Temperature Rise Test, Temperature Sensor Noises, Noise Filtering.

Omnichannel Strategy and Customer-Centricity in E-Commerce: A Systematic Literature Review

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Abstract

In an era of digital transformation, omnichannel strategy has emerged as a vital enabler of customer-centricity in e-commerce. This study undertakes a systematic literature review (SLR) to synthesize, categorize, and critically evaluate the scholarly work on omnichannel strategy and customer-centric outcomes published between 2020 and 2025 in Scopus indexed journals. The review adopts a structured review methodology following PRISMA 2020 guidelines. A total of n=61 peer-reviewed articles were analysed across dimensions such as strategic focus, customer-centric constructs, theoretical underpinnings, methodological approaches, and industry/geographic context. The findings reveal that omnichannel strategy literature is fragmented but evolving, with dominant themes including channel integration quality, personalization, customer empowerment, convenience, and loyalty. Most studies rely on technology adoption theories (TAM, UTAUT2) and relationship marketing frameworks, but lack integrative conceptual clarity. Empirical research is dominated by cross-sectional surveys, with limited longitudinal or cross-cultural studies. A significant gap exists in research from emerging economies and non-retail e-commerce sectors. This review contributes to academic discourse by providing a comprehensive mapping of omnichannel strategy–customer centricity linkages, identifying critical gaps, and offering a future research agenda. Managerially, it provides insights for e-commerce firms to design customer-centric omnichannel strategies that balance personalization, privacy, and organizational alignment.

Keywords: Channel Integration; Customer Loyalty, Customer-Centricity; Digital Customer Journey, E-Commerce, Omnichannel Strategy; Systematic Literature Review.

A New Paradigm for Corporate Sustainability: Leveraging AI, IoT, and Predictive Analytics for ESG Monitoring

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Abstract

The authors of this paper explore how the Internet of Things (IoT), artificial intelligence (AI), and predictive analytics can revolutionize environmental, social, and governance (ESG) monitoring. Given the statistically significant positive correlation between the adoption of AI and improved ESG performance, specifically in the social and governance domain, the overview shows how this technological convergence will enable the decisive transition from active, manual reporting to the active, data-driven model of risk management and performance optimization. The report serves as a guide for organizations looking to use a data-based approach to develop a more solid and sustainable long-term business model in addition to complying with regulations.

Keywords: AI, IoT, ESG, Corporate Sustainability, Predictive Analytics, Data Governance.

SP07: Machine Learning for Decision Making and Knowledge Discovery

Towards a RAG-Based Framework for Accounting Practices: Context-Aware Question Generation

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Abstract

Large Language Models (LLMs) have become, in a short time, a useful 'assistant' for professionals across many domains. To enhance their usability in specific domains, Retrieval-Augmented Generation (RAG) has emerged as a promising approach. RAG integrates domain specific data into the generation process, enabling more accurate and contextually relevant outputs (question, answer or document). In this paper, we present initial results from an ongoing project developing a RAG-based framework for accounting practices. The goal is to support practitioners by providing contextualized information that aids reasoning, offers guidance, and enables content generation aligned with professional needs. The presented RAG pipeline, focused on context aware question generation, incorporates domain-specific data collection, structure-aware document chunking (including uniform chunking, targeted table extraction, document–table separation, and semantically aware segmentation), dense retrieval using embedding models, and prompt-engineered question generation. We also constructed a ground-truth dataset of accounting-specific question–answer pairs to evaluate question quality using Hit Score and BERTScore metrics. Our results show that document structure and chunking strategies significantly influence the quality of generated questions, especially when handling heterogeneous accounting documents. Semantically guided chunking produced the most promising outcomes. Furthermore, our experiments underscore the importance of specialized processing for tables.

Keywords: Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), Question Generation, Accounting practice, Chunking, BERTScore, Hit Score.

Machine Learning and Time Series-Based Demand Forecasting in Turkish Textile Warehouses

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Abstract

This study develops demand and time forecasting models to improve inventory management and order fulfillment processes for a textile company's warehouses in Türkiye. The dataset consists of historical weekly sales and warehouse records from 2017 to 2022. Time series methods, includ-ing Holt-Winters and Seasonal ARIMA (SARIMA), as well as machine learning algorithms such as LightGBM and XGBoost, were applied and compared. Forecasting performance was evaluat-ed using Mean Absolute Error (MAE) and Root Mean Square Error (RMSE). Among the tested models, SARIMA achieved the best forecasting performance with the lowest error rates, outper-forming both the traditional Holt-Winters method and machine learning models. The results show that accurate forecasting with SARIMA improves order planning efficiency, reduces excess inventory, and minimizes stock waste. Additionally, the forecasting models pro-vided useful insights into supplier delivery behavior, supporting more proactive supply chain management. Due to its scalability, the proposed forecasting approach can be adapted to other industries that face similar challenges related to demand volatility and warehouse operations.

Keywords: Demand Forecasting and Scheduling, Forecasting Methods, Machine Learning, Time Series Analysis, Inventory Management, Order Fulfillment.

A lexicon-Based Approach for Identifying Influential Individuals within Social Networks

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Abstract

With the rise of digital technologies, marketers increasingly focus on identifying key influencers within social networks to strengthen marketing efforts and gain insights into audience behavior. These influencers play a vital role in shaping community decisions and enhancing brand visibility, trust, and sales. However, pinpointing relevant opinion leaders aligned with company goals remains chal-lenging due to their informal status, evolving behaviors, and diverse marketing contexts. Existing research has primarily identified opinion leaders based on ei-ther user interactions or content characteristics, with limited attention given to combining both dimensions. Moreover, sentiment expressed in reactions and comments is often overlooked, despite its significance in assessing user influ-ence. This study proposes a novel hybrid approach for detecting opinion leaders on Facebook by combining multiple metrics: the evolution of post content over time, interaction and engagement levels, opinion term extraction, and sentiment analysis of user comments. By computing a composite score that reflects both so-cial activity and emotional tone, the proposed method offers a more comprehen-sive and accurate identification of influential individuals. Experimental results demonstrate its effectiveness in improving influencer detection within online communities.

Keywords: Social Influencers, Post Score, Interaction Indicators, Comments Sentiment Analysis.

AI-Driven Flood Severity Forecasting for Sustainable Urban Development (SDG11): Comparing Regression, Ensemble, and Deep Learning Methods

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Abstract

Flooding poses a significant challenge to urban development, exacerbated by cli-mate change and increased urbanization. This study explores the potential of arti-ficial intelligence (AI) to improve flood severity forecasting, thereby aiding sus-tainable urban planning. We conducted a comprehensive comparative analysis of various AI models—including traditional regression techniques, ensemble meth-ods, and advanced deep learning architectures—to enhance flood prediction accu-racy and support resilient urban design. Using datasets from 25 diverse states en-compassing a wide range of urban conditions and flood-related variables, we evaluated the performance of models such as Decision Trees, Random Forests, Gradient Boosting Machines, Support Vector Regression (SVR), Lasso Regres-sion, time-series models like ARIMA and SARIMA, and neural network archi-tectures including Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), and Long Short-Term Memory networks (LSTM). The results demonstrate that deep learning models significantly outperform traditional approaches in predicting flood severity, evi-denced by the lowest mean squared error (MSE). This suggests that AI-driven models can be effectively integrated into urban planning frameworks to enhance flood management strategies and promote sustainable development. This investi-gation highlights the transformative role of AI in advancing urban planning through improved flood forecasting, providing critical insights for urban plan-ners, policymakers, and researchers, and emphasizing the importance of employ-ing advanced AI techniques to tackle environmental challenges and build resilient cities.

Keywords: AI, Flood Severity Forecasting, Deep Learning (LTSM, RNN, CNN), Regression Techniques (Linear, Lasso, Ridge), Ensemble Methods (Random Forest, Gradient Boosting), Time-Series Models (ARIMA, SARIMA).

Generating Crush Signals in Vehicle Traffic using RCNN, Hidden Markov Chain and ANN

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Abstract

Camera-based image detection techniques have become a fundamental com-ponent in autonomous driving systems, particularly for situational awareness, object recognition, and real-time decision-making processes. This study in-troduces a novel combined model that uses a single camera input to detect and predict vehicle crashes in real time by integrating R-CNN, an adjusted Kalman Filter, and an Artificial Neural Network-enhanced Hidden Markov Chain. In order to detect the object in video stream R-CNN model is used and compared with the estimated position of the vehicle predicted by adjust-ed Kalman filter. After the state transitions and probabilistic motion estima-tion is made through Hidden Markov Chain, ANN generates a signal if there is a crash. The model initiates early warnings when a possible collision is predicted. The limitations of conventional filtering techniques are addressed by the suggested architecture, which dramatically improves detection accura-cy and lowers latency under fast motion. Experiments on crash videos and simulated (CARLA) and real-world (urban Istanbul) traffic scenarios show great efficacy, with 94.5% detection accuracy in video analysis and 91.2% in real-time application. Given typical human reaction times, the ANN inte-gration helped to reduce detection latency by 0.5 seconds. These findings support the possibility of integrating probabilistic and deep learning tech-niques.

Keywords: Object Detection, Crash Prediction, RCNN, HMM.

SP08: Optimization and Decision-Making: Methods and Algorithms

Design and Implementation of a Custom ERP Framework for a Drilling Equipment Manufacturer

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Abstract

This study presents the design and implementation of a web-based Enterprise Resource Planning (ERP) system tailored for a small-to-medium-sized enterprise (SME) operating in the manufacturing sector. With a focus on GEO Sondaj Makine İmalat LTD. ŞTİ, the system was developed to digitize and streamline core operational workflows, including sales order processing, production scheduling, inventory management, procurement, and coordination between customers and suppliers. Built using the Django web framework, the ERP platform provides modular functionality with real-time data integration across departments. Unlike generic ERP packages, this custom-built solution mirrors the company's actual business processes and addresses typical challenges faced by SMEs, such as limited IT infrastructure, absence of digital records, and resistance to organizational change. The internally developed modules led to enhanced traceability, operational efficiency, and data-driven decision-making. The system also includes a simulation module to support production visualization and planning, although advanced features like bottleneck identification and dynamic queue tracking remain under development. The findings demonstrate that a cost-effective, scalable ERP system can be successfully deployed in resource-constrained environments when grounded in business-specific needs. The system was evaluated based on internal testing, interdepartmental workflow validation, and observed improvements in operational efficiency and traceability. This project offers a practical reference for other SMEs seeking to modernize their operations through digital integration.

Keywords: ERP, SME, Django, Production Planning, Inventory Management, Manufacturing.

Online Optimal Appointment Time in Digital Health Platform by Fuzzy Logic-Based TOPSIS

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Abstract

Fuzzy based TOPSIS (Technique for Order Preference by Similarity to Ideal So-lution) is highly scalable and can be applied to a wide range of problems, from small-scale decisions to large, complex multi-criteria decision-making (MCDM) problems. It is one of the popular multi-criteria decision-making techniques to ar-rive at an optimum alternative out of a set of alternatives that is assessed on sev-eral criteria. It is seen that this method is used in solving many problems of digital health applications. Especially in the appointment system, how patients perceive different time zones and which factors affect their appointment preferences have become an important research topic. The main purpose of this study is to analyze the appointment options that patients prefer more and to reveal how doctors can optimize their appointment processes according to these preferences. In addition, in this study, in addition to the effective use of digital health platforms, the contri-bution of these systems to patient satisfaction was also evaluated.

Keywords: Fuzzy Logic Based TOPSIS, Optimization, Digital Health System, Online Optimum Appointment.

A Comparative Study of AI-Generated 3D Models and Conventional Software-Based 3D Modeling Techniques: Accuracy, Efficiency, and Creative Potential

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Abstract

In this study we tried out two different 3D modeling methods—one using AI tools like Edify-3D and Tripo AI, and the other the traditional way, by hand in Autodesk Maya. Both methods were used to build the same object: a simple low-poly war robot. While the AI tools were super fast (some finished in under two minutes), they didn't give us clean geometry. There were issues like missing edge loops and messy topology, which made them tough to use for anything serious like animation. On the flip side, the manual model took longer to make—almost 7 hours—but came out clean, structured, and ready to animate. We also looked at how easy it was to change or reuse each model and checked how detailed and accurate the final output was. What we found is that AI can help you get started fast, but if you're aiming for production-quality models, manual modeling still gives better control and results.

Keywords: Artificial Intelligence (AI), 3D Modeling, Text-to-3D, Image-to-3D, Generative AI, Traditional 3D Modeling, Autodesk Maya, Neural Networks, Creative Control, Model Topology.

Reinforcement Learning for Blockchain-Enabled Supply Chain Network Design

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Abstract

In this research, blockchain-fortified supply chain network optimization with reinforcement learning methodology is approached with network planning as a combinatorial optimization problem with aims to minimize total cost while maintaining operating constraints. The two-layer network architecture consisting of supply chain participants and blockchain nodes with four distinct cost factors is developed with machine learning methodology to find optimal configurations with rational operating constraints and stochastic cost variations. Experimental findings confirm that reinforcement learning effectively addresses complex trade-offs between operation costs and blockchain integration costs effectively, successfully finding cost-efficient network configurations while ensuring connectivity constraints using structured penalty techniques. Findings confirm the ability of the proposed approach to tackle dynamic cost changes and maintain convergence properties with different networks, with performance analysis showcasing significant improvements in network cost optimization compared to random configuration approaches. The research concludes that machine learning-based optimization provides organizations with a robust, scalable model for blockchain integration decision-making in supply chain networks, efficiently balancing technology implementation costs with operational efficiency demands to enable well-informed blockchain adoption strategies and offer pragmatic solutions for cost-effective implementation and sustaining network functionality and connectivity restrictions.

Keywords: Blockchain Technology, Supply Chain Management, Reinforcement Learning, Q-Learning, Cost Minimization, Machine Learning, Optimization.

Efficiency Measurement using Non-parametric Analysis in Presence of Undesirable Outputs: A SBM-DEA Approach

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Abstract

The prevalent economic principle of weak disposability has been the foundation for studies in environmental assessment using Data Envelopment Analysis (DEA). According to world commissions on the environment, reducing undesirable (bad) outputs often demand employing the concept of weak disposability instead of free disposability assumptions. Weak disposability is perceived to have significant analytical power in measuring the efficiency of Decision-Making Units (DMUs). Addressing the reducing of undesirable outputs, a non-radial model grounded on individual proportion abatement factor is presented. Given a decreased desirable output vector, the proposed model anticipates a satisfaction amount of undesirable outputs reduction. With respect to this least wastage, the weak disposable technology can analyze the changeable production with reduction of both the desirable and undesirable outputs. Concurrently, the model ensures a corresponding reduction in desirable inputs. Numerical instances illuminate the practicality and robustness of the proposed model and demonstrate its superior performance over its original counterpart.

Keywords: Data Envelopment Analysis (DEA), Decision Making Units (DMU), Slack Variables, Undesirable outputs, Weak Disposability, Efficiency.

Specification of lower and Upper limits of crop yield using Evapotranspiration and Crop Yield Index

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Abstract

In this study, analysis of crop production is considered as problem of probabilistic modeling where assumption and choice of appropriate distribution are critical. More specifically, support that a particular distribution takes into account is emphasized in this study.
Problem/motivation: In the process of model selection, specification of the lower and upper limits (support) of the problem variable (crop yield) is, among other tasks, needed to be addressed.
Objective/purpose: The aim of this work was to construct a function that robustly provides minimum and maximum yield specifications and to maximize the range of crop yield by deploying grid -search (GS) and boundary condition (BC) methods.
Method / Design: A production function based on evapotranspiration (ETPF) is considered based on a quadratic yield function, and a crop yield index (CYI) takes into account agronomic information and historical crop yield information, respectively. To illustrate the study, information for teff yield—a major cereal and staple crop in Ethiopia—was used.
Major findings: A general yield function that can be reduced into maximum and minimum crop yield functions based on value of the parameter of the quadratic yield function and the actual evapotranspiration (ETa) of a particular crop specified. Moreover, using grid-search and boundary equation methods, the value of agronomic parameters was estimated and examined for various crop yield index values.
Results and conclusion: With the interest of specifying the lower and upper limits of a crop yield, a generalized crop yield function was constructed using ETa and crop yield index (CYI) values for parameters specified and compared using grid-search and boundary condition methods. As reported in the respective results of the methods deployed, the choice of values for the lower and upper limits of crop yield is a function of the interest and purpose of the model selection problem.

Keywords: Crop Yield, CYI, ETPF, Range, Grid-Search, Boundary Condition.

SP09: Intelligent Logistics Optimization: Reasoning, Deep Learning, and Predictive Approaches

Optimizing Non-Emergency Patient Transport with Variable Neighborhood Search: A Real-World Case Study

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Abstract

Transportation is vital in healthcare and can save lives by allowing patients to receive medical services on time, especially those with serious conditions or mobility issues. Effective transporta-tion networks contribute to better health outcomes and help avoid treatment delays. This paper addresses the Multi-Trip Dial-a-Ride Problem (MTDARP) for non-emergency patient transport, which is essential for enabling patients to attend therapy sessions, specialized treatments, and routine check-ups. In this context, ambulances must plan multi-stop routes while respecting time windows, vehicle capacity limits, and precedence constraints. Each route begins and ends at the depot (hospital), with ambulances picking up patients at their origins and delivering them to their destinations. We propose a new Variable Neighborhood Search (VNS) algorithm to optimize routes, leveraging systematic neighborhood exploration to escape local optima. Using real-world data from the Hong Kong Hospital Authority, we demonstrate that VNS achieves solutions up to 28% better than a state-of-the-art Memetic Algorithm (MA), while reducing computational time by 90%. Our approach provides hospitals with a practical, scalable, and cost-effective scheduling tool.

Keywords: Healthcare Service, Ambulance Scheduling, Non-Emergency Patient Transport, Varia-ble Neighborhood Search, Multi-Trip Dial-a-Ride Problem, Real-World Data.

An Insertion Reasoning Approach based on Local Search

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Abstract

The Dial-A-Ride Problem (DARP) presents a pivotal optimization challenge within intelligent transportation systems, focusing on the efficient routing of vehicles to serve passengers with distinct pickup and drop-off locations while satisfying stringent time windows and vehicle capacity constraints. This paper introduces an advanced version of the Insertion Based Reasoning method, which enhances an existing framework by integrating a local move mechanism into the solution acceptance criteria to achieve more refined and efficient routing solutions. The proposed approach involves a multi-layered strategy that combines heuristic- based route construction, knowledge-driven reasoning, and localized solution refinement to address the complexities of on-demand transportation. The method employs an Insertion Heuristic to generate initial feasible routes. This heuristic iteratively assigns customer requests to vehicle tours by prioritizing early service times and ensuring compliance with capacity and duration constraints. The heuristic's solutions serve as a foundation for further optimization through Case-Based Reasoning (CBR). To assess the quality of solutions, the enhanced IBR- DARP introduces a local move mechanism within the acceptance criteria phase. This local search strategy explores neighboring solutions by applying a move operation, which involves removing a customer request from one vehicle's route and reinserting it into another route at a valid position. This operation enables a deeper exploration of the solution space, allowing the algorithm to escape local optima and identify routes that better minimize total travel costs while adhering to operational constraints. By combining the computational efficiency of heuristics, the knowledge-driven adaptability of CBR, and the fine-tuned optimization of local search, this enhanced IBR-DARP approach seeks to advance the development of intelligent on-demand transportation systems. It offers a flexible framework that can accommodate varying problem sizes and operational conditions, paving the way for more responsive and sustainable mobility solutions in urban environments.

Keywords: Insertion Heuristics; Case based reasoning On-Demand Transport; Optimization; Dynamic Routing; Transportation systems, Local search.

Greedy Insertion with Queue-based Retry and Dynamic Acceptance Control

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Abstract

This work addresses the challenge of managing transportation requests in real-time within the context of a Dynamic Dial-A-Ride Problem (D-DARP). A dynamic insertion framework is proposed, combining a greedy heuristic with a queuing mechanism to handle the gradual arrival of requests under strict operational constraints, including vehicle capacity, passenger ride time, and a dynamic feasibility threshold. The system evaluates each new request upon arrival, either inserting it immediately if feasible or temporarily placing it in a queue for reinsertion. Extensive simulations were conducted using twelve synthetic benchmark instances with varying sizes and complexity. Experimental results demonstrate high service rates and low rejection levels, showcasing the system's ability to adapt to dynamic load while maintaining constraint compliance and computational efficiency. These findings provide a robust baseline for future enhancements involving predictive models and real-world data integration.

Keywords: Dynamic Dial-A-Ride Problem, Real-Time Request Management, Insertion Heuristic, Queue Mechanism.

Hybrid Deep Learning Models for Short-Term Forecasting Item Demands in Retail

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Abstract

In a dynamic and uncertain economic environment, forecasting product demand poses a problem, especially in retail. Overstocking generates costs that can weigh on the company's overheads. On the other hand, understocking can harm the company's profitability. Inventory management represents a major investment and a potential source of waste that needs to be carefully controlled. Accurately forecasting future demand is crucial for businesses operating in competitive and dynamic environments. It is also essential for effective resource management, strategic planning, and informed decision-making in several sectors, including retail. This study explores four hybrid deep learning models for short-term forecasting of item demand, emphasizing their practical application and operational implications. These models are evaluated and compared using several criteria to determine which one performs best in providing accurate and robust forecasts.

Keywords: Demand Forecasting – CNN-RNN - GRU- LSTM- Bilstm - MSE- MAE - R-Square.

Location Optimization of Micro-Depots in Urban Food Logistics

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Abstract

This study focuses on the issue of the location of micro-depots in urban areas in connection with the organization of food distribution. Given the rapid growth in demand for food products in cities, the need to reorganizing urban logistics is im-perative. The Two-Echelon Location Routing Problem with Time Windows (2E-LP-VRPTW) addresses the unique challenges of transporting perishable goods. The main objective is to determine optimal locations for micro-distribution centers (MDC), whether the city center or on the outskirts, to enhance the efficiency of urban deliveries. To address the complexity of this problem combining location and routing, a method based on Variable Neighborhood Search (VNS) was adopted. This heuristic approach was compared to an exact method to evaluate its performance in different scenarios. The VNS approach achieved near-optimal so-lutions with computation time reductions of over 98%, especially on large in-stances with up to 100 retailers. The hybrid zone configuration (IN/OUT) also enabled cost savings of up to 7.2% compared to other layouts. To test and vali-date our approach, we generated a set of problem instances that simulate realistic urban food distribution settings. These instances were designed to reflect typical challenges encountered in last-mile delivery operations, such as demand variabil-ity, vehicle capacities, and service time windows. The obtained results show that the good positioning of the MDCs not only optimizes logistics operations but al-so ensures reliable deliveries while controlling costs.

Keywords: Micro-depots, Facility Location, Vehicle routing problem with time windows (VRPTW), Variable Neighborhood Search, Two-Echelon.

SP10: Data-Driven and Multi-Criteria Approaches for Sustainable and Safe Systems

Data-Driven Assessment of Carbon Footprint in Concrete Mix Proportions: A Machine Learning Approach

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Abstract

This study introduces a novel machine learning framework for predicting the CO_2 footprint of blended cement concrete mixtures based solely on mix composition parameters, eliminating the need for detailed life cycle inventory data. The approach is motivated by the growing need for rapid and accurate sustainability assessments in the early stages of concrete design, without requiring detailed life cycle inventory data. A comprehensive dataset compiled from the literature is used to train and evaluate multiple regression algorithms, including Extra Trees, AdaBoost, Ridge, Lasso, Decision Tree, and XGBoost. Prior to model training, missing values are addressed through mean imputation, and normalization is applied to ensure consistency across variables. Hyperparameter optimization is performed for each model to improve generalization performance. The models are evaluated using stratified k-fold cross-validation to ensure that the distribution of the target variable is preserved across folds. Performance is assessed using standard metrics, including the coefficient of determination (R^2), root mean square error (RMSE), and mean absolute error (MAE). Among the evaluated models, XGBoost achieves the highest prediction accuracy with an R^2 value of 0.91 on the test set. The results confirm that the proposed framework provides a reliable and computationally efficient method for estimating CO_2 emissions, offering practical utility for early-stage decision making in sustainable concrete mix design.

Keywords: CO_2 footprint, Machine learning, Sustainable construction, XGBoost algorithm.

Machine Learning-Based Multi-Class Classification of Physiological Signals from WESAD Dataset for Stress and Affective State Detection

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Abstract

Stress has a detrimental impact on multiple physiological systems of the human body, including psychological, cardiovascular, immune, and musculoskeletal systems. Early detection of stress and related emotional states is crucial for safeguarding both mental and physical health, as well as for enhancing productivity in daily activities. Recent advances in wearable technologies have enabled the continuous monitoring of emotional states through physiological signals, thereby facilitating timely detection.

In this study, we propose a multi-class machine learning framework utilizing chest and wrist sensor data from the publicly available WESAD dataset. The dataset comprises a diverse range of physiological signals, including accelerometer (ACC), electrocardiogram (ECG), electromyogram (EMG), galvanic skin response (EDA), blood volume pulse (BVP), temperature, and respiration. From each signal channel, statistical features such as mean, standard deviation, and minimum values were extracted. Several machine learning models were trained to classify three emotional states: rest (baseline), stress, and positive emotion (amusement). Performance metrics were computed for each model, and the results were comparatively analyzed. Experimental findings reveal that the Gradient Boosting algorithm achieved the highest accuracy of 97.93%. Compared with existing studies in the literature, this outcome demonstrates a remarkably high performance for a multi-class classification setting that integrates multiple physiological signal sources.

Keywords: WESAD, Machine Learning, Stress and Affective State Detection.

Okullarda Su Verimliliğinin Sağlanması için Eğitim ve Kapasite Geliştirme Bileşenlerinin FUCOM Yöntemi ile Analizi

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Abstract

Su tüketiminin en yüksek olduğu kurumlardan biri olan okullarda su tasar-rufunun sağlanması amacıyla verimlilik ve sürdürülebilirlik uygulamaları oldukça değerlidir. Mevcut su kaynaklarını korumak ve devamlılığını sağla-mak amacıyla tüketimler kontrol altına alınmalı, israfın önüne geçilmelidir. Bu çalışmada okullarda su tasarrufunun sağlanması amacıyla eğitim ve kapa-site geliştirme faaliyetlerinden oluşan 47 bileşen, su verimliliği kurumsal ka-pasite, su verimliliği etkinliklerinin planlanması ve uygulanması, personel için su verimliliği kapasite geliştirme ve öğrenciler için su verimliliği kapa-site geliştirme ana başlıkları altında incelenmiştir. Çalışmada ana başlık ve alt bileşenler için ayrı ayrı değerlendirme modelleri oluşturularak ağırlık katsayıları az sayıda ikili karşılaştırma yaparak tam tutarlılık sağlayan FUCOM yönteminin doğrusal programlama ile çözümü sonucu elde edilmiştir. Sonuçlar incelendiğinde ana faaliyet başlıklarında ağırlık katsayılarına göre sıralamanın su verimliliği etkinliklerinin planlanması ve uygulanması (0.628), öğrenciler için su verimliliği kapasite geliştirme (0.157), su verimliliği kurumsal kapasite (0.126) ve personel için su verim-liliği kapasite geliştirme (0.09) olduğu görülmektedir. Bileşenlerin küresel ağırlık katsayıları incelendiğinde ise bakım ekibi için eğitim düzenleme sıklığı (SE12), Su verimliliği etiketleri oluşturulan su kullanım alanı (SE1), Su verimliliği için pano/ köşe güncelleme durumu (SE2) bileşenleri en yüksek ağırlık katsayılarını almıştır. Yapılan bu çalışma, okullarda su verim-liliğinin sağlanması ve sürdürülebilir su yönetimi faaliyetlerinin yürütülme-sinde temel oluşturan eğitim ve kapasite geliştirme indeksinin analizinde yol gösterici nitelik taşımaktadır.

Keywords: Su tasarrufu, Su verimliliği, FUCOM, Devlet okulları, Sürdürülebilirlik İndeksi.

Su Tasarrufu Amacıyla Okullarda Denetim, Kontrol ve Bakım Bileşenlerinin FUCOM Yöntemi ile Değerlendirilmesi

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Abstract

Su kaynaklarının sınırlı olması ve artan kuraklık, tüketimin ve su ihtiyacının su kaynaklarının verimliliğini tehdit etmesi sonucu su kaynaklarını koruma-ya yönelik çalışmalara aciliyet kazandırmaktadır. Özellikle okul gibi su tü-ketiminin fazla olduğu kurumlarda su tasarrufunun sağlanması su verimliliği açısından önem taşımaktadır. Belirli zaman periyotlarında tesisat için gerçekleştirilecek denetim ve kontrol çalışmaları ile envanter bilgilerin top-lanması, şebeke elemanlarının izlenmesi, kontrolü ve oluşturulacak bakım-onarım planlamaları ile ciddi oranlarda su tasarrufunun sağlanabileceği düşünülmektedir. Bu çalışmada okullarda su tasarrufunun sağlanmasında Denetim, Kontrol ve Bakım (DKB) faaliyetleri kapsamında Bina İçi Kontrol ve Denetim (BD), Açık Alan Kontrol ve Denetim (AD) ve Su Sayacı Yöne-timi (SY) ana başlıkları altında yirmi altı bileşen belirlenmiştir. Bu bileşen-lerin su verimliliği ve tasarrufu üzerindeki etki düzeylerinin belirlenmesinde ise çok kriterli karar verme tekniklerinden olan FUCOM yöntemi uygu-lanmıştır. Sonuçlar ana kategoriler içerisinde 0.763 ağırlığı ile Bina içi Kontrol ve Denetim (BD) faaliyetlerinin en etkili olduğunu gösterirken alt bileşenler içerisinde ise Muslukların Açık/Sızdırma durumu kontrol sıklığı (BD10), Muslukların kontrol ve denetim sıklığı (BD4) ve Bina tesisat ve boruların sızıntı kontrol ve denetim sıklığı (BD5) bileşenlerinin en yüksek global ağırlık katsayılarına sahip olduğunu göstermektedir. Yapılan çalışmanın okullarda su tasarrufu sağlamak için su sistemlerinin bakımına yönelik bir talep yönetimi çözümünün kısa vadeli kazanımlarını değer-lendirmede yardımcı olacağı düşünülmektedir.

Keywords: Su tasarrufu, Su verimliliği, FUCOM, Devlet okulları, Sürdürülebilirlik İndeksi.

Evaluation of Occupational Health and Safety Law Legislation Applications in the Construction Sector with Multi-Criteria Decision Making Methods

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Abstract

Occupational Health and Safety (OHS) is of great importance for our country and other countries; millions of people around the world lose their lives every year as a result of occupational accidents and occupational diseases. In Turkey, issues related to occupational health and safety, duties and responsibilities of employers, employees and other authorized persons; It is regulated by the provisions specified in the Occupational Health and Safety Law No. 63331 dated 20/6/2012 and the relevant regulations published on the basis of Article 30 of this Law. The main purpose of this study is to prevent occupational accidents arising from the work carried out in the construction sector and evaluations will be made in order to ensure that employees can carry out their work in a healthy and safe manner, and the effectiveness of the legislation will be evaluated by using CRM methods. In the study, the sectoral applicability of the occupational health and safety law numbered 6331 and the evaluation of the effectiveness of the legislation with multi-criteria decision making (MCDM) methods will be evaluated. In the application of the study, the effectiveness of the legislation will be evaluated by using the criteria determined based on the sector by using AHP, TOPSIS and VIKOR integrated in MCDM methods and improvement suggestions will be presented by identifying the deficiencies. The proposed framework could be brought to the legislation evaluation process.

Keywords: Occupational health and Safety, Construction Industry, Multivariate Decision Making Methods.

A Multi-Criteria Decision-Making Approach to Evaluating Occupational Health and Safety Legislation Practices in the Aviation Sector

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Abstract

In this study, the effectiveness of occupational health and safety (OHS) regulations in the aviation sector was evaluated through an analytical approach using multi-criteria decision-making (MCDM) methods. In the first stage, the criteria weights were calculated using the Analytic Hierarchy Process (AHP) based on the contributions of five experts, identifying "Number of Occupational Accidents" as the most critical criterion. In the second stage, alternatives such as the Law No. 6331, SHGM OHS Regulations, EASA Standards, and ICAO Annex 19 were analyzed through the TOPSIS method based on their proximity to the ideal solution, with the EASA Standards determined as the most appropriate alternative. In the final stage, policy recommendations were developed using the VIKOR method to address legislative gaps. The findings highlight the necessity of ensuring international compliance, strengthening independent OHS structures, and prioritizing risk management based on human factors. The study offers a comprehensive decision support framework for improving OHS practices in the aviation sector.

Keywords: Occupational Health and Safety, AHP, TOPSIS, VIKOR.

Kavramsal Hidrolojik Model Kalibrasyonunda Evrimsel Algoritmaların Yakınsama Performansı: Amaç Fonksiyonu Çağrılarının Sayısının Etkisi

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Abstract

Havza ölçeğinde yağış–akış ilişkilerinin doğru modellenmesi, hidrolojik model kalibrasyonunda kullanılan optimizasyon algoritmalarının hem yakınsama hızı hem de nihai performans açısından değerlendirilmesini gerektirir. Kavramsal yağış–akış modelleri (CRRM'ler) düşük veri gereksinimleri ve esnek yapıları nedeniyle yaygın kullanılmakta, ancak başarılı simülasyonlar için titiz bir kalibrasyon süreci gerekmektedir. Bu çalışmada, farklı amaç fonksiyonu çağrılarının sayıları (NOFC) altında 14 optimizasyon algoritmasının yedi CRRM üzerindeki yakınsama ve performansları karşılaştırılmıştır. Türkiye'nin batısında, yarı kurak iklime sahip Beydağ Baraj Havzası çalışma alanı olarak seçilmiş; yağış ve sıcaklık verileri meteoroloji istasyonlarından, akım verileri ise DSİ'ye ait gözlem istasyonundan temin edilmiştir. Kalibrasyon sürecinde genetik algoritma (GA), diferansiyel evrim (DE) varyantları, parçacık sürüsü optimizasyonu (PSO), gri kurt optimizasyonu (GWO), yapay arı kolonisi (ABC), karıştırılmış karmaşık evrim (SCE) algoritması ile Levenberg–Marquardt algoritmasının entegrasyonu sonucu elde edilen hibrit yaklaşımlar (HPSO, HDE, HGWO) kullanılmıştır. Performans değerlendirmesi Nash–Sutcliffe (NS) ve logaritmik NS (LNS) katsayıları ile yapılmış; yakınsama hızı geometrik yakınsama oranı ile ölçülmüş, algoritmalar TOPSIS yöntemi ile sıralanmıştır. Sonuçlar, HPSO, HDE, DE4, DE5 ve PSOm algoritmalarının belirli NOFC seviyelerinde öne çıktığını, GA, SCE, GWO ve ABC'nin ise çoğu senaryoda düşük sıralarda kaldığını göstermektedir. Bulgular, algoritma seçiminde çalışma alanı özellikleri, hedeflenen akım rejimleri ve hesaplama süresinin birlikte değerlendirilmesi gerektiğini ortaya koymaktadır.

Keywords: Kavramsal yağış–akış modelleri; Amaç fonksiyonu çağrısı sayısı; Optimizasyon algoritmaları; TOPSIS; Çok kriterli karar verme.

SP11: AI-Driven Information Systems for Governance, Healthcare, and Sustainability

Government Digitalization and Tax Collection Efficiency in Emerging Economies

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Abstract

This study aims to find an appropriate theoretical framework to address the driv-ing mechanisms of government digitalization on changes in government func-tions. Our empirical strategy mainly consists of two distinctive steps. The first step involves digital transformation and digital technologies related to public fi-nance, while the second step describes the estimation procedure. To focus on the public finance side, we subdivide government digitalization into several dimen-sions (at least 4 dimensions) and its functions alterations into at least two related dimensions in tax collection performance. Variables are defined based on the pro-cess of digitalization. In the second stage, applying panel data estimating tech-niques, we used DEA and SFA derived efficiency data to regress the efficiency of the selected tax units on the independent and control variables. Including 16 se-lected emerging economies over the 2018-2022 period, our results indicate that digital technologies such as e-invoicing, artificial intelligence related to machine learning, cloud computing, data science, chatbot, and e-payment have a positive and significant effect on tax collection efficiency and productivity. Furthermore, digital transformation in the financial sector, education, online services, and other departments have an enhancing effect on the efficiency. Additionally, our robust-ness checks indicate that the endogeneity effect in the model cannot be rejected and previously obtained results are consistent. It is worth noting that some part of inefficiency can be justified by the theory of "rational inefficiency".

Keywords: Digital technologies, Digital transformation, Tax collection Efficiency, Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA), Ra-tional Inefficiency.

A Dynamic Forecasting and Multi-Objective Optimization Framework for Efficient Resource Management in Physiotherapy Center

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Abstract

Efficient resource management in physiotherapy centers is crucial to meet the growing demand for rehabilitation services while maintaining high service quality. This study proposes an innovative dynamic framework that integrates advanced forecasting models and a multi-objective optimization approach to improve operational decision-making in physiotherapy centers. A deep learning-based forecasting module is first developed to predict patient demand across different centers by capturing complex temporal patterns. Subsequently, a robust multi-objective optimization model is formulated to simultaneously minimize operational costs, reduce patient waiting times, and maximize service coverage, while considering realistic constraints such as staff capacity, equipment availability, and treatment duration limits. To address the computational complexity of the proposed model, a novel hybrid metaheuristic solution combining Ant Colony Optimization (ACO) and Local Search techniques is introduced. This hybrid method enhances the exploration and exploitation balance, leading to high-quality solutions within reasonable computational time. Experimental results based on a simulated real-world dataset demonstrate the superior performance of the proposed framework compared to conventional approaches. The findings highlight the potential of dynamic, data-driven optimization models in advancing healthcare service delivery, offering actionable insights for policymakers and managers of physiotherapy networks. Future research directions are also discussed, including the integration of real-time decision-making systems and uncertainty modeling to further enhance the adaptability of physiotherapy operations.

Keywords: Physiotherapy Centers, Deep Learning Forecasting, Multi-Objective Optimization, Hybrid Metaheuristic, Healthcare Operations Management.

Harnessing Information Systems for Sustainable Enterprise Development: A Systematic Literature Network Analysis

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Abstract

Information Systems (IS) are pivotal enablers of sustainable development, enhancing operational efficiency and resilience in enterprises and supply chains. This study applies a Systematic Literature Network Analysis (SLNA) of 132 peer-reviewed articles to map research trends linking IS and sustainability. Citation Network Analysis identifies three principal research domains: sustainable competitive advantage, environmental sustainability, and sustainable online social communities, alongside emerging domains such as IS in developing countries and sustainable information infrastructures. Main Path Analysis (MPA) traces the intellectual evolution of these areas, revealing how IS integration with firm resources supports competitive differentiation and environmental performance, consistent with the Resource-Based View (RBV). Green IS initiatives mitigate environmental risks and are linked to improved financial outcomes. The study also highlights digital engagement dynamics in sustainable online communities, emphasizing member participation, social interaction, and thematic coherence. Overall, the findings align with the Triple Bottom Line (TBL) framework, demonstrating IS contributions across economic, environmental, and social dimensions of sustainability. These insights inform both academia and practice on aligning digital transformation with sustainability goals.

Keywords: Information Systems, Sustainable Development, Green IS, Citation Network Analysis, Online Communities, Triple Bottom Line, Developing Economies.

XAI-Augmented Decision Support Systems for Complex, Multi-Criteria Problems in Uncertain Healthcare Environments

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Abstract

Under uncertainty, healthcare decisions often involve conflicting criteria (e.g., di-agnosis accuracy, patient risk, treatment cost). While data-driven models offer strong predictive performance, their opacity limits clinician trust and adoption. We present a cloud-based, Java-implemented decision support system (DSS) that combines multi-criteria decision analysis (MCDA) with explainable AI (XAI) techniques—SHAP (SHapley Additive exPlanations) and LIME (Local Inter-pretable Model-Agnostic Explanations). The system enhances transparency by generating local explanations for black-box model outputs. Its modular frame-work spans data preprocessing, machine learning, explanation generation, and multi-criteria evaluation. A real-world case study, such as disease risk prediction, demonstrates how SHAP/LIME visualizations increase clinical interpretability. The MCDA layer aggregates conflicting objectives into an interpretable decision score, supporting more informed choices. We evaluate the system using conven-tional metrics (accuracy, precision, recall, F1) and explanation integrity measures, showing that XAI improves user understanding without sacrificing performance. Future directions include real-time inference, richer uncertainty modeling, and guidance on integrating XAI into healthcare DSS workflows.

Keywords: Explainable AI (XAI), Decision Support Systems (DSS), MCDA, Clinical Transparency, Cloud Computing, Java Architecture.

The Role of Green Information Systems in India's Environmental Sustainability: A Review-Based Perspective

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Abstract

As India pursues its sustainability and digital transformation goals under initia-tives such as Digital India and Mission LiFE (Lifestyle for Environment), the rel-evance of Green Information Systems (Green IS) has grown significantly. De-spite increasing adoption of green practices in Indian enterprises, academic re-search on Green IS within the Indian context remains fragmented and underex-plored. This study presents a systematic and comprehensive review of global and Indian academic literature on Green IS and juxtaposes it with insights from in-dustry practices. The review identifies key thematic categories such as environ-mental sustainability, energy-efficient computing, green business processes, and IT-enabled eco-innovation. Furthermore, it highlights the limited contextual stud-ies from India and suggests research directions to bridge the gap between global theory and Indian practice. Key limitations in existing literature, such as the ab-sence of longitudinal studies and the lack of sector-specific research in emerging economies like India, are addressed. Future research should explore sectoral ap-plications of Green IS in Indian SMEs, public services, and rural digital initia-tives to align with India's climate commitments and sustainable development goals. Recent studies emphasize the role of Green IS in reducing carbon foot-prints and enabling sustainable operations in Indian enterprises. The integration of Green IS in India's smart city and digital governance initiatives is seen as criti-cal to achieving long-term environmental goals. However, there remains a gap in localized, empirical research that captures how Green IS practices are adopted in diverse Indian contexts such as public administration, agriculture, and SMEs.

Keywords: Green Information Systems, Green IT, Sustainability, India Digital Transformation.

SP12: Machine Learning, Deep Learning, and Neural Networks

A Regression-Based Analysis of Factors Influencing CO_2 Emissions Across Countries: A Systematic Literature Review

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Abstract

This study presents a systematic literature review of academic publications from 2010 to 2024, aiming to identify the key factors influencing carbon dioxide (CO_2) emissions across various countries. It synthesizes empirical findings on the effects of economic growth, energy consumption, industrialization, and demographic characteristics on emission levels. Additionally, the study compares regression-based analytical approaches with machine learning techniques used in the reviewed literature. Drawing from reputable academic databases, the review provides a comprehensive cross-sectoral and cross-regional evaluation. The analysis reveals dominant methodological trends and identifies significant research gaps, offering valuable insights and recommendations for future studies on environmental policy and emission modeling.

Keywords: CO Emissions, Regression Analysis, Economic Factors, Energy Consumption, Industrialization.

Computational Modeling of Phase Transformation in 15-5PH Stainless Steel under Rapid Induction Heating using FEM–JMAK Framework

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Abstract

This study presents a predictive computational framework integrating finite ele-ment simulation (FEM) with the Johnson-Mehl-Avrami-Kolmogorov (JMAK) model to investigate phase transformations in 15-5PH martensitic stainless steel under rapid induction heating. The motivation lies in achieving faster, more local-ized heat treatment while ensuring predictable microstructural evolution. Various induction heating parameters (frequency, amperage, voltage, and coil distance) were simulated to predict temperature distribution within the sample. Using QuickField software, electromagnetic and thermal analyses were conducted and validated against experimental data. The non-isothermal JMAK model was adapted to use FEM-generated temperature fields to predict precipitation kinetics. Simulation and SEM results showed strong alignment, confirming the effective-ness of the proposed framework. This integration enables advanced predictive control in intelligent materials processing for aerospace and manufacturing appli-cations.

Keywords: Finite Element Simulation (FEM), JMAK Model, Induction Heating.

Intelligent and Energy-Aware Task Scheduling in Cloud Systems

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Abstract

The rapid advancement of information technologies has significantly reshaped industrial operations and daily life, leading to a growing demand for responsive and scalable digital services. Among the technologies addressing this growing need, cloud computing has emerged as a foundational infrastructure for delivering on-demand computing resources over the internet. However, its increasing adoption presents complex challenges such as managing dynamic workloads and minimizing virtual machine (VM) usage costs. Therefore, cloud service providers aim to optimize performance and reduce the operational costs of VMs by integrating intelligent scheduling algorithms. In response to this need, the present study explores the use of algorithms, particularly focusing on machine learning driven approaches, to enhance the sustainability and efficiency of cloud systems. Specifically, the study investigates the effectiveness of reinforcement learning through Q-learning for optimizing task scheduling against the traditional Round Robin (RR) scheduling algorithm. The primary objective is to evaluate their performance in minimizing VM usage costs within dynamic and continuously evolving cloud environments. Experimental results indicate that in reducing costs, Q-learning outperforms RR with a 33.14% improvement, demonstrating its superior adaptability and cost efficiency under varying conditions. These insights highlight the potential of reinforcement learning to enable intelligent and cost-aware scheduling strategies in modern cloud computing systems.

Keywords: Cloud Computing, Operation Cost, Round Robin, Virtual Machines, Q-Learnin.

Comprehensive Review for Rice Blast Disease Using Deep Transfer Learning

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Abstract

Rice is a fundamental food crop for more than half of the global population, especially in agrarian countries like Bangladesh. However, fungal diseases such as leaf blast, neck blast, and node blast, caused by Magnaporthe oryzae, threaten rice production and endanger food security. This study proposes an automated rice leaf disease detection system using deep transfer learning and multi-level feature extraction to improve early diagnosis accuracy. A real-time dataset of 1,500 annotated rice leaf images was collected from the fields of Sherpur and Mymensingh and categorized into three major disease classes. Preprocessing techniques, including resizing, normalization, grayscale conversion, Gaussian blur, and advanced augmentation methods, were applied to enhance dataset quality and diversity. Six state-of-the-art pre-trained Convolutional Neural Network (CNN) models—EfficientNetV2S, ResNet50V2, MobileNetV2, VGG16, DenseNet121, and Xception—were finetuned and evaluated. Feature extraction was performed at multiple levels (shallow, texture-based, and deep semantic layers) to capture detailed disease characteristics. Among the models, EfficientNetV2S achieved the highest classification accuracy of 99.28%, outperforming others in both generalization and training stability. The proposed system offers a scalable, high-performance solution suitable for real-time deployment in rural and lowresource environments. This work contributes significantly to smart agriculture, enabling farmers to detect diseases early, reduce crop loss, and adopt sustainable management practices.

Keywords: Rice Blast Disease, Deep Learning, Transfer Learning, CNN, Resnet, Efficientnet, Precision Agriculture.

A Privacy-Preserving and Explainable Machine Learning Model for Student Performance Prediction in Virtual Environments

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Abstract

This paper presents a privacy-preserving and explainable machine learning model designed to predict student performance in virtual university environments. Rec ognizing the increasing reliance on digital platforms for education, our approach addresses the critical challenges of protecting student data privacy while ensuring transparency in model decisions. We utilize federated learning and differential privacy techniques to safeguard sensitive information, enabling decentralized analysis without direct data sharing. To enhance interpretability, we integrate state-of-the-art explainability methods such as SHAP and LIME, providing actionable insights for educators and stakeholders. The model is trained and evaluated on synthetic datasets simulating real-world academic records from a university context, demonstrating robust predictive accuracy and clear, inter pretable outcomes. Our results highlight the effectiveness of combining privacy and explainability for responsible AI deployment in educational settings. This research offers a scalable framework for universities aiming to harness machine 1 learning for student success, while rigorously maintaining ethical and privacy standards in virtual environments.

Keywords: Privacy-Preserving Machine Learning, Explainable AI, Student Performance Prediction, Virtual Learning Environments, Federated Learning.

SP13: Industry 4.0, Supply Chain 4.0, and Logistics 4.0

Integration of ISO Standards into the Educational Process of Training Teachers of Vocational (Professional and Technical) Education in Transport while Designing Logistics Systems

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Abstract

This article investigates the integration of ISO standards into the educational pro-cess for training teachers of vocational and technical education in the transport sector, focusing on logistics system design. The relevance of preparing educators with up-to-date knowledge and teaching methodologies, particularly in applying international quality standards within logistics, is emphasized. The interdisciplinary nature of this integration covers standardization, professional pedagogy, transport logistics, and quality management. Educational programs in fields such as Professional Education (Transport), Professional Education (Logistics), Transport Technologies, and Logistics offered by higher and professional pre-tertiary institutions were examined to identify existing content related to logistics fundamentals, transport processes, modeling, and project management. Based on this analysis, a competency-based model was developed to ensure that future teachers acquire critical thinking skills, the ability to integrate theory and practice, and competencies to introduce innovations responding to current challenges in the transport industry. Interactive teaching methods and forms were proposed to en-hance learning outcomes. The model was validated through a case study on opti-mizing humanitarian aid logistics during wartime conditions. The results demon-strate the feasibility and necessity of systematic integration of international quality standards in teacher education to equip future professionals with the capacity to effectively design and manage logistics systems in compliance with global quality requirements.

Keywords: Logistics System Design, Training of Education Seekers, Vocational (Professional and Technical) Education, Simulation Modeling, Case Method, ISO Standards.

Smart Complexes in Engineering Education: A Postmodernist Approach to the Digital Learning Environment

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Abstract

The article examines the use of smart complexes of academic disciplines as an innovative approach to enhancing the effectiveness of training future engineers. The research problem centers on the need to adapt engineering education to the conditions of a postmodern society, characterized by rapid digitalization, fragmentation of knowledge, and increasing demand for interdisciplinary flexibility. The theoretical framework is grounded in a postmodernist approach that emphasizes adaptability, self-organization, and the individualization of the learning process. Both qualitative and quantitative methods are employed to analyze the impact of smart complexes on students' digital literacy and professional skills. The findings confirm the effectiveness of smart complexes: creativity increased by 26%, critical thinking improved by 37%, and problem-solving skills grew by an average of 29%. The implementation of self-assessment mechanisms resulted in a 23% increase in student motivation and a 32% rise in learning engagement. Key challenges in implementing digital technologies in education were identified, and strategies to overcome them were discussed. The study proves that smart complexes contribute to the formation of an interactive and adaptive educational environment that equips future engineers with the competencies required to succeed in a technology-driven professional landscape.

Keywords: Intelligent Complexes, Digital Tools, Specialist Training, Engineering Education, Adaptive Learning, Digital Learning Environment.

Cloud-Based Multi-Langual License Plate Recognition Using YOLO and OCR

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Abstract

This research presents a cloud-based License Plate Recognition (LPR) framework that integrates advanced computer vision techniques, Easy-OCR technology and cloud computing to build modern transportation infrastructure and security applications by automate identification and tracking of vehicles through their license plates. This study has been collected 3500 bangli car license plate dataset presents a comparative analysis of three YOLO models—YOLOv8n, YOLOv8s, and YOLOv11 to detect the license plate in real time video capture. According to the performance, YOLOv11 outperformed then the other methods and achieving the highest mean average precision (mAP) 98.24 respectively in our collected license plate dataset. The performance of our proposed model has real time object detection capabilities while Easy-OCR is then used to efficiently read and extract alphanumeric characters from the detected plates in dynamic traffic environments.by integrating cloud environment. By integrating cloud-based data transmission ensures unlimited data storage and processing, and helps to development more flexible and powerful automated LPR applications for traffic management that can accessed anywhere with proper internet connection. This research highlights the combining YOLO, OCR, and cloud computing to enhance traffic law enforcement, improve road safety and provide a smart transportation ecosystem in smart city solutions. The potential of the study that integrate intelligence systems and helps implement and optimize cloud-based LPR solution for real-world applications.

Keywords: License Plate Recognition (LPR), Cloud Computing, Real-Time Object Detection, Computer Vision, Bangla License Plate Dataset, Intelligent Transportation System (ITS), YOLOv11, OCR.

A Framework for Blockchain-Enabled Sustainable Supply Chain

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Abstract

Blockchain technology, although still considered a relatively new innovation, has rapidly emerged as a transformative and fast-growing concept in supply chain management (SCM). In parallel, social concerns, such as labor rights, ethical sourcing, and community impact, have recently gained significant attention among researchers and scholars, much like environmental concerns did previously alongside economic performance objectives. These three dimensions (economic, environmental, and social) collectively constitute the comprehensive concept of sustainability within a supply chain (SC) system. With the growing global emphasis on sustainable development, effectively integrating these three pillars into SC strategies has become essential for long-term success and resilience. This paper proposes a detailed and structured framework for implementing blockchain technology within sustainable supply chains (SCs). The framework is further enhanced by integrating mathematical modeling techniques and game theory approaches to facilitate strategic adoption. Finally, the study examines practical benefits, potential limitations, and key managerial implications through an in-depth SWOT analysis, providing actionable insights for policymakers and SC practitioners aiming to balance innovation with sustainability goals.

Keywords: Blockchain, Sustainable supply chain, SWOT.

Revolutionizing Dairy Sustainability with Digital Technologies and Circular Economy Practices

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Abstract

The dairy industry serves an essential role in the worldwide food system, still it encounters considerable environmental challenges such as rising carbon emissions, massive water consumption, and wastage problems. Considering the growing demand for dairy products, it is essential to improve the sustainability of the sector. Digital technologies are playing essential role in contribution towards sustainability and circular economy initiatives. The dairy industry has been reshaped by technological advances including the artificial intelligence (AI), Internet of Things (IoT), blockchain and big data analytics. This research examines the impact of digital technology on the transformation of the dairy industry which aims to improve environmental sustainability and economical resilience. The research explores current technological advances and their particular applications in the dairy sector, emphasizing the effectiveness of their adoption in different dairy operations. The article explores the barriers and enablers of implementing digital solutions into CE models, encompassing technological, economic, and regulatory dimensions. Through the utilization of digital technologies, the dairy industry has the potential to substantially diminish its environmental footprint, optimize productivity, and progress towards a sustainable future. The research emphasizes the critical role of innovation and collaboration in developing a sustainable economy and offers a roadmap to future research.

Keywords: Circular Economy, Sustainability, Dairy Industry, Digital Technologies, Artificial Intelligence, Waste Management.

Assessing the Adoption and Utilisation of the 4IR Technologies in South African Higher Education Institutions: An Empirical Study

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Abstract

The Fourth Industrial Revolution (4IR) is transforming higher education globally by integrating advanced technologies such as Artificial Intelligence, Internet of Things, Big Data, Blockchain, and Cloud Computing. However, South African higher education institutions (HEIs) face significant challenges in adopting these technologies, including infrastructural limitations, funding constraints, and re-sistance to change. This study investigates the factors influencing the adoption of 4IR technologies in South African public and private HEIs, focusing on both technology-specific factors (cost, complexity, compatibility) and institutional fac-tors (top management support, institutional structure, satisfaction with existing systems).

Quantitative research design was employed, collecting data via structured online surveys targeting academic, administrative, and IT staff across diverse HEIs. Using Structural Equation Modelling (SEM), the study analysed relation-ships between these factors and 4IR technology adoption.

Findings indicate that top management support, perceived relative advantage, compatibility, and institutional structure significantly enhance 4IR adoption, while complexity negatively impacts it. Contrary to common assumptions, cost was found to have an insignificant effect on adoption decisions. These results high-light the critical role of organisational readiness and leadership commitment in driving digital transformation in South African HEIs.

The study contributes theoretically by extending technology adoption models with institutional factors in the 4IR context and offers practical insights for poli-cymakers and university leaders aiming to foster effective and inclusive digital innovation in higher education.

Keywords: Fourth Industrial Revolution; Higher Education; Technology Adoption; Structural Equation Modelling; Digital Transformation.

SP14: Decision-Making and Support Systems in an Uncertain Environment

Hybrid MCDM Model for Evaluating Sustainable Logistic Village in Türkiye on Economic Perspective

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Abstract

As global trade volumes continue to rise, the strategic importance of international trade for national economies becomes increasingly evident. In this context, the development of logistics communities and organizations has emerged as a crucial element in strengthening countries' positions within global supply chains. Türkiye due to its geostrategic location along major trade routes and its role as a global connectivity hub, has recognized the potential of logistics villages as tools for promoting regional integration and local economic development. While several logistics villages are already operational, others remain in the planning or development phase. This study specifically focuses on the environmental evaluation of such planned projects, highlighting how environmental factors influence the viability and sustainability of logistics infrastructure. This study investigates the economic aspects of logistics villages in Türkiye through the application of the fuzzy entropy-based TOPSIS method, a MCDM approach that enables the integration of uncertainty and subjectivity into the evaluation process. The findings underscore the growing relevance of economically informed decision-making in the context of sustainable logistics development. In the study, distance to border gates, foreign trade income, investment cost, transportation cost/logistics cost criteria were used to determine the potential economic efficiencies of five logistics villages in the planning and project phase. As a result of the study, the logistics villages were compared and ranked according to the most economically suitable alternative.

Keywords: Logistic Village, Economic Impact, TOPSIS, Fuzzy Logic, Entropy.

Modeling Changes in Resource Value of Biocenoses Under the Impact of Local Catastrophes Caused by Military Actions

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Abstract

The article addresses the problem of changes in the resource value of biocenosis for phytophagous insects as a consequence of military activity – namely, artillery shelling. To construct the model, a resource value matrix (the ratio of resources to risk) was calculated and integrated with local catastrophe simulations, mimicking explosion effects. The algorithm for resource value change included the following: at the epicenter, a reduction coefficient of 0.1 was applied; in the adjacent eight cells, under severe impact (explosions of 100, 122, 152, or 155 mm shells), a coefficient of 0.2 was used; for medium – caliber impacts (57, 76, 85 mm), 0.3; and for minor impacts (20, 23, 25 mm), 0.5. In cases of overlapping impact zones of the same intensity, a coefficient of 0.15 was applied. Spatial distribution was assessed using Lloyd's index, defined as the ratio of (S^2–X + X^2) to the mean value X. Distribution types were categorized as follows: uniform for LI∈]0;1[, random for LI∈ [1; 2[, and contagious for LI∈ [2; + ∞[. A decrease in spatial heterogeneity of the resource value was observed, with distribution shifting from contagious to random. When the catastrophe impact zone covered up to 75% of the area, and 15% of cells were epicenters of large-caliber shell explosions, the distribution transitioned to a random pattern, which could be linearly extrapolated to full (100%) biocenosis coverage. Uniform distribution was achieved under high-density overlapping of epicenter zones – an effect analogous to a "scorched-earth" scenario. The hypothesis that Lloyd's index decreases from contagious to random values under the influence of local catastrophes was confirmed. The formalization of the spread of local catastrophe impacts from epicenters may be represented as an inverse function to the spatial growth of phytophagous insects populations from a reproduction center to the agrocenosis periphery.

Keywords: Resource-Value Models, Spatial Distribution, Contagion, Lloyd's Index (LI), Catastrophic Impacts, Munitions, Biocenoses, Phytophagous Insects.

A Dynamic Capability-Based Part Flow Assignment Problem with a Multi-Stage Stochastic Programming Approach

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Abstract

In the context of today's Industry 4.0 applications, smart and multitasking machines are capable of performing a wide range of tasks due to their enhanced flexibility in processing capabilities. This feature makes them highly adaptable to dynamically changing manufacturing environments, which involve process requirements of a wide range of products, alternative process routings, and demand uncertainty, alternative process routings, and demand uncertainty. In such circumstances, routing flexibility arises from overlapping machine capabilities (which is generally underestimated and remains hidden) rather than merely specifying alternative machines or machine replicas for the manufacturing operations. In this research, both the processing requirements of parts (i.e., manufacturing routes) and the processing capabilities of machines are described via Resource Elements (REs), which are machine-independent, facility-specific capability units representing the distinct and shared capability boundaries of machines. Accordingly, a novel capability-based part flow assignment problem along with its mixed-integer programming model formulation, which can be considered as a key input for facility layout design problems, is introduced, for the first time in the literature. To address the uncertainties in product demands, processing times, and total processing requirements for the REs, a multi-stage stochastic programming approach is employed in LINGO optimization software and several robust solutions are generated according to different probability distribution functions under different scenarios.

Keywords: Capability-Based Art Flow Assignment Problem, Facility Layout Design, Mixed-Integer Linear Programming, Multi-Stage Stochastic Programming Approach.

Fuzzy Inner Approximation Approach to an Unequal-Area Facility Layout Design Problem with Fuzzy Department Areas

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Abstract

In traditional unequal-area facility layout design problems, most previous research has considered that departments' area requirements are deterministic or known in advance. On the other hand, area requirements of departments may involve some degree of ambiguity and can be considered as fuzzy parameters due to the highly volatile and uncertain nature of manufacturing environments. Moreover, since the area requirements are stated as fuzzy, the aspect ratios between the side lengths of departments should also be represented by fuzzy numbers. Based on this motivation, this research introduces the fuzzy version of the well-known and widely used polyhedral inner approximation approach in the existing literature to approximately linearize the constraints related to the area requirements of departments. To achieve this, the slopes and intercepts of the secant lines are firstly provided by making use of α-cut-based fuzzy arithmetic operations (i.e., fuzzy division, multiplication, square root, etc.). Then, an interactive resolution method that is based on α-cuts and expected values/expected intervals of the fuzzy numbers is applied to transform the fuzzy area requirement constraints in the mixed-integer programming model of the present problem into the crisp equivalent form. The provided crisp equivalent model is solved, and optimal layout design alternatives are generated under different uncertainty levels (α-cuts) by using the Gurobi optimizer in the Spyder–Python IDE. With the help of the proposed fuzzy inner approximation method, facility layout designers can obtain several α-acceptable layout design alternatives under different uncertainty levels.

Keywords: Fuzzy Mathematical Programming, Unequal-Area Facility Layout Design Problem, Polyhedral Inner Approximation Method, Mixed-Integer Non-Linear Programming.

Performance Evaluation with Mamdani Type Fuzzy Inference System

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Abstract

Performance evaluation in businesses is a process of great importance and considerable sensitivity. In this process, contrary to what is desired, subjective evaluations can emerge. This study presents an approach based on fuzzy logic and fuzzy inference system (FIS) as an alternative to classical performance evaluation methods. This alternative approach aims to evaluate personnel performance in a more flexible and nuanced manner. For this purpose, the performance evaluation scores of 25 expert personnel working in a unit of a public institution were assessed using a Fuzzy Inference System (FIS) by their managers. To achieve this, literature studies on Fuzzy Inference System have been examined. Following that, fuzzy logic and fuzzy inference systems were mentioned. The performance measurements of public personnel, which is the subject of this study, were utilized. The evaluation of performance ratings given separately by two managers has been restructured using fuzzy logic. The general inference system was applied with the Mamdani approach and different results were obtained from the classical performance evaluation process.

Keywords: Fuzzy Logic, Mamdani Fuzzy Inference System (Mamdani - FIS), Performance Evaluation.

SP15: Artificial Intelligence and Digitalization for Sustainable and Resilient Societal Systems

Effects of an Electrostatic Screen Between LV & HV windings of a Transformer used in SPVPP on Harmonics

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Abstract

As time progresses, renewable energy sources are gaining increasing atten-tion. In this context, solar power plants (SPPs) are being established in many parts of the world, and efficiently delivering the DC voltage generated by the panels to the grid has become crucial. The DC voltage is converted into AC voltage through inverters and then transmitted to the step-up transformer be-tween the power plant and the grid. Harmonics present in this voltage nega-tively affect transformer efficiency and lifespan, as well as the quality of the energy supplied to the grid. Various methods are employed to minimize har-monics, one of which is the use of an electrostatic screen or shielding circuit between the low-voltage (LV) and high-voltage (HV) windings. After com-pleting the optimal design of a 1000 kVA SPP transformer, this study simu-lates its performance using the finite element method in Ansys Maxwell to evaluate the effectiveness of the electrostatic screen. According to the simu-lation results, the electrostatic screen proved effective in reducing harmonics.

Keywords: Solar Transformers, Harmonics, Electrostatic Screen.

Design and Implementation of a Personalized AI-Powered Well-Being Assistant

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Abstract

The increasing complexity of modern work environments, hybrid working mod-els, and post-pandemic psychological stress have highlighted the critical im-portance of employee well-being and sustainable productivity. In response to these challenges, this study introduces the design and implementation of a per-sonalized AI-powered well-being assistant aimed at monitoring, supporting, and enhancing employee mental health and workplace satisfaction. The proposed sys-tem integrates advanced natural language processing (NLP), sentiment analysis, and behavior-aware recommendation algorithms to deliver real-time, personalized interventions via a mobile and web-based platform. The architecture of the assis-tant includes four key layers: (i) user interaction interface, (ii) emotional state analysis module, (iii) AI-driven personalized recommendation engine, and (iv) well-being activity tracking and feedback system. Utilizing pre-trained transform-er-based models such as BERT and DistilBERT, the system can detect user sen-timent through daily journal inputs and conversational interactions. In parallel, a supervised learning model estimates individual stress levels, while a contextual recommendation engine suggests cognitive-behavioral practices, micro-breaks, and adaptive productivity tips tailored to the user's profile and behavioral history. Preliminary prototype testing with pilot users demonstrated that the system effec-tively increased subjective motivation scores and reduced perceived stress levels over a four-week trial. Moreover, the assistant's sentiment detection accuracy reached 89.3%, while user engagement metrics indicated a high level of interac-tion and satisfaction. Although the platform is currently in a prototype stage, its architecture has been designed with privacy-by-design principles, including en-crypted local storage, minimal data retention, and anonymized emotional profil-ing. These components aim to ensure future compliance with major data protec-tion frameworks such as the GDPR and the Turkish KVKK. This study contrib-utes a novel, interdisciplinary approach that combines human-centered artificial intelligence, behavioral psychology, and workplace well-being management. By integrating explainable AI components and user feedback loops, the platform as-pires to become a scalable and ethically responsible digital companion for sus-tainable organizational health.

Keywords: Artificial Intelligence, Well-Being Assistant, Sentiment Analysis, Personalized Recommendations, Employee Mental Health, Explainable AI, Human-Centered Design.

A Next-Generation AI-Enhanced Scheduling and Resource Optimization Framework for Educational Institutions: Leveraging LLMs and Intelligent Forecasting in Dynamic Learning Environments

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Abstract

The growing demand for agile, scalable, and high-quality educational delivery—especially in an era defined by digital transformation and data-centric institutional governance—necessitates the adoption of intelligent scheduling systems capable of adapting to complex operational variables. Conventional manual scheduling approaches, predominantly reliant on heuristic human judgment and static rule-based systems, frequently underperform in optimizing critical academic resources such as classrooms, faculty assignments, and student time blocks. These inefficiencies often culminate in resource underutilization, elevated administrative costs, and suboptimal student outcomes.

To address these challenges, this study introduces an advanced Learning Management System Optimization framework (LMSOPT), which leverages recent breakthroughs in Artificial Intelligence (AI), including Long Short-Term Memory (LSTM) neural networks for dynamic enrollment forecasting, and integrates Large Language Models (LLMs) for qualitative context processing in planning workflows. The system architecture synergistically combines LSTM-based time-series modeling with a hybrid optimization engine employing Constraint Programming (CP), Genetic Algorithms (GA), and Tabu Search (TS) to resolve the multi-objective nature of academic scheduling under conflicting constraints.

The LMSOPT platform dynamically reconciles three core goals: (i) maximizing classroom and instructor resource efficiency, (ii) minimizing latency in student scheduling and waiting periods, and (iii) aligning institutional capacities with personalized learner demand. Furthermore, real-time data integration and explainable AI components ensure transparent, adaptive decision-making that supports human planners rather than replacing them—thus enabling trust and interpretability.

Expected contributions include demonstrable gains in scheduling efficiency, reduced operational overhead, improved satisfaction metrics for both students and faculty, and the provision of a modular, extensible research infrastructure to explore future AI applications in educational planning. The system is designed in alignment with national digitalization strategies and aims to advance the adoption of AI-driven, evidence-based decision support in academic administration. Empirical validation through comparative performance analysis highlights the replicability and scalability of the system across institutional contexts of varying complexity and size [1], [2].

Keywords: Artificial Intelligence, Well-Being Assistant, Sentiment Analysis, Personalized Recommendations, Employee Mental Health, Explainable AI, Human-Centered Design.

Harnessing Artificial Intelligence for Predicting, Evaluating, and Shaping Public Policies: Toward Enhanced Social Resilience

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Abstract

This paper, employing a qualitative meta-synthesis approach, explores the role of artificial intelligence (AI) algorithms in predicting, evaluating, and implementing public policies, with a particular focus on strengthening social resilience. The cen-tral research question is how AI can be leveraged to improve policymaking pro-cesses and enhance the capacity of societies to withstand crises. Findings, drawn from the analysis of 20 scholarly sources, one international report, and five na-tional policy documents from Iran, reveal that AI—through big data analytics, predictive modeling, and automated systems—has the potential to optimize gov-ernmental decision-making, reduce human errors, and enable more equitable re-source allocation. At the predictive stage, machine learning algorithms support the early identification of emerging risks and trends; in the evaluation phase, data-driven dashboards and real-time analytics enhance policy effectiveness; and dur-ing implementation, intelligent systems improve the efficiency and accountability of public services. Nevertheless, challenges such as inadequate data infrastruc-ture, ethical concerns, and algorithmic biases may hinder the realization of these potentials. The case of the COVID-19 pandemic in Iran illustrates that responsi-ble application of AI can promote citizen engagement, improve resource distribu-tion, and strengthen public trust, thereby fostering social resilience. The study proposes a conceptual framework that emphasizes transparency, ethics, and ac-countability as prerequisites for integrating AI into policymaking. Policy recom-mendations include establishing legal frameworks, promoting algorithmic trans-parency, and investing in data infrastructures to transform AI into a practical tool for resilient governance.

Keywords: AI-Driven Policymaking, Social Resilience, Predictive Analytics, Crisis Man-agement, Digital Governance.

Digitalisation for smart and climate-neutral cities: the case of Ukraine

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Abstract

Digitalisation is increasingly regarded as a driving force for the transition towards smart and climate-neutral cities. By introducing new tools for governance, service delivery and energy management, digital technologies can optimise resource flows, enhance transparency and support citizen participation. Yet their ecological implications remain contested, since energy-intensive models such as blockchain's Proof of Work highlight the risk of undermining climate goals. This paper examines the role of digitalisation in advancing smart and climate-neutral cities, with Ukraine serving as a focal case. The country's trajectory demonstrates rapid progress: from early experiments in e-government, through the institutionalisation of the Ministry of Digital Transformation in 2019, to the adaptive use of digital platforms during wartime. Services such as Diia – which integrates blockchain to ensure trust, security and immutability of digital records – together with eVorog and the Air Alert application, illustrate how digital tools ensure continuity of governance and resilience despite severe disruption. At the same time, the study underlines the potential of emerging technologies – particularly digital twins and smart grids – to support post-war reconstruction. These instruments enable real-time modelling, integration of renewables and climate-responsive planning for energy, transport and housing systems. The findings suggest that while digitalisation is not inherently sustainable, when embedded in coherent regulatory and governance frameworks it can become a decisive enabler of resilience and climate-neutral urban futures.

Keywords: Smart Cities; Digital Transformation; Digital Twins; Ecological Renovation; Climate Neutrality; Ukraine; Sustainable Reconstruction.