The 25th International Conference on Informatics in Economy (IE 2026)

Recent Advances in Education, Research, and Practical Applications of AI

Conference Program

Cluj-Napoca, Romania
May 07-08, 2026

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Babeș-Bolyai University of Cluj Napoca

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Preface

This year, the ***25th International Conference on INFORMATICS in ECONOMY (IE 2026)***, Recent Advances in Education, Research, and Practical Applications of AI, has been held in a hybrid format in *Cluj-Napoca, Romania, on 07 – 08 May 2026*. The Conference promotes research results in Business Informatics and related Computer Science topics:

- *Artificial Intelligence Theory and Applications*
- *Big Data Management, Processing and Analytics*
- *Smart Cities and Sustainable Communities*
- *IoT, Mobile and Multimedia Solutions*
- *Cloud, Distributed and Parallel Computing*
- *Cybersecurity and Critical Infrastructures*
- *Cybernetic Approaches in Quantitative Economics*
- *Digital Business and e-Transformation*
- *IT Deployment in Cultural Institutions*

The Conference has represented a meeting point for participants from all over the world, both from academia and from industry.

The conference was first organized in 1993 in collaboration with researchers from Institut National des Sciences Appliquées de Lyon (INSA de Lion), France. From 1993 to 2011, the conference has been organized once every two years, publishing in ten editions high quality papers and bringing together specialists from around the world. Starting with 2012, the conference takes place annually, the 11th, 12th, 14th, 15th, 16th, 21st, and 22nd edition volumes have been indexed by ISI Thomson Reuters in its ISI Proceedings directory. Also, the 20th – 24th editions have been indexed in Scopus and published in Springer.

The International Conference on Informatics in Economy is one of the first scientific events on this subject in Romania and during the last ten years has gained an international scientific recognition. At national level, remains one of the most important scientific events that gather the entire Romanian Economic Informatics community.

The conference has made partnerships with international journals like *Economic Computation and Economic Cybernetics Studies and Research, Informatica Economică, Economy Informatics, Database Systems Journal, Journal of Logistics, Informatics and Service Science, Journal of System and Management Sciences* to publish an extended format of the conference best papers.

In an era of accelerated technological change, IE 2026 addresses emerging challenges and opportunities at the intersection of education, research, and business innovation, encouraging interdisciplinary exchange and collaboration.

A Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Conference Team

Conference Important Events

Thursday, May 7th, 2026		
Time	Event	Hall name
09:00 – 09:30	**Registration & Coffee break**	**Aula (FSEGA building)**
09:30 – 10:00	**IE 2026 Opening Ceremony** Prof. Cristian - Marius **LITAN**, PhD ViceRector of the Babes-Bolyai University Cluj Napoca Assoc. Prof. Béla - Gergely **RÁCZ,** PhD ViceDean of the Faculty of Economic Sciences and Business Administration, Babes-Bolyai University Cluj Napoca Acad. Florin-Gheorghe **FILIP**, PhD Romanian Academy, Romania	**Aula (FSEGA building)**
10:00 – 11:00	Prof. Pedro R. **PALOS SÁNCHEZ** University of Seville, Spain *"Building a Sustainable Digital Economy: Integrating Machine Learning and Ethical Technology Use"*	**Aula (FSEGA building)**
11:00 – 11:30	**Coffee break**	**Aula (FSEGA building)**
11:30 – 12:30	Prof. Wouter **VERBEKE** KU Leuven, Belgium *"Machine Learning for business decision-making"*	**Aula (FSEGA building)**
12:30 – 12:45	Cristina **ROTARU** Director People & Culture department, Allianz Țiriac *"When All(ianz Tiriac) met…AI"*	**Aula (FSEGA building)**
13:00 – 14:00	**Lunch break**	**Cantina FSEGA**
14:00 – 18:00	**Paper presentations**	**Rooms available on each section**
18:00 – 21:00	**IE 2026 Conference Dinner**	**Casa Dacilor, Str. Brâncusi Constantin 86A**

Friday, May 8th, 2026		
Time	Event	Hall name
09:00 – 12:00	**Paper presentations**	**Rooms available on each section**
12:00 – 13:00	**Lunch break**	**Cantina FSEGA**
13:00 – 14:00	Bus transport to Turda Salt Mine	
14:30 – 17:00	**Guided visit to Turda Salt Mine**	
17:30 – 21:30	**IE 2026 Conference Dinner**	**ISSA Resort, Aleea Durgăului 6, Turda**
21:30 – 22:30	Bus transport to FSEGA	

CONFERENCE PROGRAM

– SECTION 1 –

Data Analytics, IoT and Emerging Digital Infrastructures

In response to the growing integration of data-driven technologies and interconnected digital systems, this section brings together contributions focused on data analytics, IoT-based applications, distributed computing, and domain-specific digital infrastructures. It integrates research across key thematic areas such as "Big Data Management, Processing and Analytics", "Cloud, Distributed and Parallel Computing", "IoT, Mobile and Multimedia Solutions", and "IT Deployment in Cultural Institutions". The papers included in this section address diverse application domains, including healthcare (clinical decision support systems and hospital process mining), sports analytics, social media analysis, and industrial environments. Several contributions explore IoT ecosystems, covering privacy assessment, autonomous payments, and elderly monitoring systems, while others examine distributed systems challenges and database performance optimization. In addition, the section includes studies on digital transformation in cultural institutions and process modeling in editorial workflows. Together, these works highlight the role of data-centric architectures, interoperable systems, and emerging digital infrastructures in enabling scalable, intelligent, and context-aware solutions across multiple sectors.

Thursday, 7th May, 14:00 – 18:00, Room: 118
Chairman: Mircea Georgescu, Secretary: Cristina-Claudia Osman

1. **DATABASE ARCHITECTURES AND DATA INTEROPERABILITY IN CLINICAL DECISION SUPPORT SYSTEMS: A BIBLIOMETRIC ANALYSIS -** Iulian-Ionut Ciobanu;

2. **DATA SOURCES IN OPEN FOOTBALL ANALYTICS: BROAD POSITION CLASSIFICATION WITH THE FBREF AND TRANSFERMARKT DATASETS -** Mihai-Sorin Iosupescu and Marin Fotache**;**

3. **FROM EVENT LOGS TO INSIGHT: A COMPARATIVE PROCESS MINING ANALYSIS OF HOSPITAL BILLING -** Călina-Mihaela Oprea, Cristina-Claudia Osman and Miranda-Petronella Vlad**;**

4. **PERFORMANCE ANALYSIS FOR IN-PROCESS DATABASES. CASE STUDY: DUCKDB -** Cătălina Badea, Diana Savina Mirăuțe and Marin Fotache**;**

5. **MAPPING HAPPINESS IN TURKISH TWEETS -** Esra Kahya Özyirmidokuz, Eduard Stoica, Kumru Yalçınkaya;

6. **A SECURE WEB-BASED REMOTE-CONTROL FRAMEWORK FOR FANUC INDUSTRIAL ROBOTS -** Carmen Milea, Daria-Maria Preda, Bogdan Iancu;

7. **DEPENDENCY AMPLIFICATION IN DISTRIBUTED ORDERING: CAUSALITY LIMITATIONS UNDER SUB-EXPONENTIAL IOT NETWORK CONDITIONS -** Alexandru Stan, Gheorghe Cosmin Silaghi and Cristian Sorin Bologa;

8. **A CONCEPTUAL FRAMEWORK FOR THE DIGITALIZATION OF MUSICAL PROJECTS IN THE DIGITAL ECONOMY** - Teodora Irava and Mircea Georgescu;

9. **PROCESS MODELING OF EDITORIAL WORKFLOWS IN A UNIVERSITY PRESS: A BPMN-BASED APPROACH** - Vasile Moraru;

10. **DESIGNING MIXED REALITY EXPERIMENTS FOR NEXT GENERATION OF SCIENTISTS AND ENGINEERS. TRANSITIONING FROM THE LABORATORY ENVIRONMENT TO REAL-WORLD USE CASES** - Cosmin Tomozei, Iulian Furdu and Florinela Floria;

11. **FROM OBSERVATION TO LABEL: AUTOMATING PRIVACY ASSESSMENT OF IOT DEVICES USING PACKET SNIFFING** - Robert Ticu-Jianu and Catalin Boja;

12. **AN OPTIMIZATION MODEL FOR IOT SYSTEM PROCUREMENT IN ELDERLY MONITORING** - Constanta Zoie Radulescu, Marius Radulescu and Radu Boncea;

13. **A CONCEPTUAL FRAMEWORK FOR SECURE AUTONOMOUS PAYMENTS IN RETAIL IOT: THE CONTEXTUAL ZERO-TRUST (CS-ZT) APPROACH** - Alisa Harkai, Cristian Eugen Ciurea and Lorena Batagan;

– SECTION 2 –

Digital Transformation, Smart Business and Sustainable Communities

This section brings together contributions exploring the impact of digital transformation on organizations, business models, and smart communities. It integrates research across two main thematic areas: "Digital Business and e-Transformation" and "Smart Cities and Sustainable Communities". The papers address topics such as AI adoption, digital process innovation, knowledge management, and data-driven decision-making, highlighting the role of technologies like machine learning, process mining, and ERP-integrated systems in reshaping organizational practices.
In addition, the section examines digital platforms, consumer behavior, and startup ecosystems, while also emphasizing sustainability through applications in smart food supply chains, EV infrastructure, and disaster management. Collectively, the contributions underline the importance of aligning technological innovation with organizational, social, and environmental dimensions to support sustainable and scalable development.

Thursday, 7th May, 14:00 – 18:00, Room: 102
Chairman: Dan-Andrei Sitar-Tăut, Secretary: Diana-Ștefania Ghenie

1. **ORGANIZATIONAL CULTURE AS A MEDIATOR: DIGITAL TRANSFORMATION, AI ADOPTION, AND EMPLOYEE MOTIVATION IN THE ROMANIAN PUBLIC SECTOR** - Mircea-Alexandru Lungu;

2. **KNOWLEDGE GRAPHS AS THE SEMANTIC FRAME FOR DESIGN THINKING KNOWLEDGE MANAGEMENT SYSTEM: A HEALTHCARE FEASIBILITY CASE** – Anca Moldovan;

3. **IDENTIFYING THE DETERMINANTS OF STARTUP SCALABILITY USING MACHINE LEARNING TECHNIQUES: A COMPARATIVE STUDY ON GROWTH BARRIERS IN ROMANIA** - Razvan-Marin Barbosu and Stelian Stancu;

4. **UNCOVERING CONSUMER DISCUSSIONS ON SOCIAL MEDIA: EVIDENCE FROM YOUTUBE COMMENTS** - Diana-Ștefania Ghenie, Andrei-Octavian Mălan and Dan-Andrei Sitar-Tăut;

5. **PROCESS MINING MEETS INSTITUTIONAL REALITY: DIGITAL PROCESS TWINS IN UNIVERSITY ADMINISTRATION** - Larisa-Elena Stângaciu and Mircea Radu Georgescu**;**

6. **EMBEDDING ROUTE OPTIMIZATION IN ERP SYSTEMS: A DESIGN-SCIENCE ARTIFACT FOR DIGITAL COMMERCE LOGISTICS** - Florina Livia Covaci, Bianca Pascu and George Sebastian Chis;

7. **DESIGN THINKING FOR GREEN DIGITAL TRANSFORMATION: EMPIRICAL EVIDENCE ON DIGITAL INTENSITY AND SUSTAINABLE PRACTICES IN EUROPEAN ENTERPRISES** - Marian Pompiliu Cristescu, Ana-Maria Constantinescu, Radu-Anton Moldovan and Dumitru Alexandru Mara;

8. **SMART DISASTER MANAGEMENT** - Costinela-Beatrice Pastinica and Franceska Balint;

9. **DECODING AI RECOMMENDATIONS: TOWARD A CONCEPTUAL S-O-R MODEL OF PERSONALIZATION, PRIVACY CYNICISM AND IMPULSE BUYING** - Andor Alexandru Daniel Hărău and Maria Elena Ghețe;

10. **PLAY TO LEARN: TRANSFORMING COMPUTER SCIENCE EDUCATION THROUGH SERIOUS GAMES** - Daniela Popescul, Raluca-Petronela Mahu;

11. **AGRIEATS: A SERVERLESS MULTI-APPLICATION ECOSYSTEM FOR LOCAL FOOD SUPPLY CHAINS** - Andrei Corpodean and Sergiu Jecan;

12. **ADVANCING SMART AND SUSTAINABLE EV CHARGING INFRASTRUCTURE THROUGH ANALYTICS AND RENEWABLE ENERGY INTEGRATION** - Victor Suciu, Lucian Necula, Madalin Silion, Cristian Beceanu, Lucian Luminaroiu, George Suciu and Constanța Alexandru;

13. **A REPRODUCIBLE AND EXPLAINABLE MCDA-BASED FRAMEWORK FOR ERP PRE-SELECTION IN SIMULATED DECISION SCENARIOS** - Vasile Paul Bresfelean, Cristian Bologa, Silviu Claudiu Popa, Alin Grig Mihis, Calin-Adrian Comes and George-Sebastian Chis;

– SECTION 3 –

Cybersecurity, Threat Detection and Critical Digital Infrastructures

This section integrates contributions from the thematic area "Cybersecurity and Critical Infrastructures", focusing on advanced approaches to securing digital systems in increasingly complex environments. The papers address both technical and human-centric dimensions of cybersecurity, covering topics such as intrusion detection systems, SIEM architectures, adaptive threat detection using machine learning, and post-quantum cryptography for IoT environments.
In addition, the section explores cybersecurity from a strategic and analytical perspective, including bibliometric mapping of AI-driven security research and the development of taxonomies for attacks and mitigation strategies. Particular attention is given to the human factor, highlighting the role of organizational culture and behavioral dynamics in strengthening cybersecurity resilience. Together, these contributions emphasize the need for integrated, intelligent, and multi-layered security frameworks to protect critical digital infrastructures.

Friday, 8th May, 09:00 – 12:00, Room: 127
Chairman: Daniel Mican, Secretary: Luigia Gabriela Sterie

1. **THE HUMAN FIREWALL: HOW KNOWLEDGE OF SECURITY THREATS AND INFORMATION SECURITY CULTURE AFFECTS CYBERSECURITY BEHAVIOR -** Luigia Gabriela Sterie, Daniel Mican and Alina Veronica Făt;

2. **A MULTI-LAYER ADAPTIVE THREAT DETECTION ARCHITECTURE FOR WINDOWS COMBINING STATIC ANALYSIS, BEHAVIOURAL MONITORING, AND MACHINE LEARNING -** Alexandru-Cristian Bardaș;

3. **SECURE AI EMBEDDED LINUX KERNEL MODULE WITH PQC ALGORITHMS FOR INTRUSION DETECTION/PREVENTION SYSTEM IN IOT -** Mariuca Pricop, Mihai Doinea, Cristian Toma, Marius Popa and Andrei Cazacu;

4. **GREENNIDS: A BENCHMARK WORKFLOW AND ANALYSIS DATASET FOR NETFLOW INTRUSION DETECTION EXPERIMENTS -** Lilia-Eliana Popescu-Apreutesei and Sabina-Cristiana Necula;

5. **IMPLEMENTATION OF A SIEM SYSTEM FOR MONITORING AND ANALYSIS OF CYBER ATTACKS -** Andrei Corpodean and Ana-Maria Ghiran;

6. **A BIBLIOMETRIC ANALYSIS OF AI DRIVEN DECISION SUPPORT SYSTEMS FOR CYBERSECURITY -** Catalin Raul Halic, Dominic Bucerzan and Crina Anina Bejan;

7. **A TAXONOMY OF ATTACKS AND MITIGATIONS IN THE CONTEXT OF CONTINUOUS AUTHENTICATION BASED ON BIOMETRICS AND BEHAVIORS -** Daniel-Marian Dănilă and Alin Zamfiroiu;

– SECTION 4 –

Economic Cybernetics and Data-Driven Modeling

This section integrates contributions from the thematic area of economic cybernetics, focusing on the application of data-driven and quantitative methods to analyze complex economic systems. The papers employ a variety of approaches, including clustering techniques, econometric modeling, graph-based learning, and multivariate statistical analysis to capture structural dynamics and interdependencies within economic environments.
The contributions address topics such as quality of life dynamics in European cities, the impact of oil price volatility on economic performance, the identification of systemically important banks using graph learning methods, and cross-country differences in digitalization, trade, and sustainability. In addition, the section includes research on spatial efficiency and resource allocation in healthcare systems. Collectively, these works highlight the role of economic cybernetics in supporting a deeper understanding of nonlinear relationships, structural disparities, and the evolving behavior of economic systems through data-driven modeling approaches.

Friday, 8th May, 09:00 – 12:00, Room: 118
Chairman: Nora Chiriță, Secretary: Ionuț Nica

1. **URBAN QUALITY OF LIFE DYNAMICS IN EUROPEAN CITIES BE-FORE, DURING, AND AFTER THE PANDEMIC: EVIDENCE FROM FUZZY CLUSTERING** - Ionuț Nica, Irina Georgescu, Ștefan Ionescu and Camelia Delcea;

2. **DIGITALIZATION, TRADE, INNOVATION, AND SUSTAINABILITY ACROSS EUROPEAN COUNTRIES: A MULTIVARIATE EXPLORATORY ANALYSIS** - Nora Chiriță, Virginia Mărăcine, Zahra Hoseini and Jani Kinnunen;

3. **A COMPARATIVE ANALYSIS OF CORRELATION AND REGRESSION PATTERNS BETWEEN OIL PRICE AND ECONOMIC WELLNESS OF SELECTED EUROPEAN COUNTRIES** - Costin Boldea and Ion Buligiu;

4. **AUTOMATED IDENTIFICATION OF SYSTEMICALLY IMPORTANT BANKS WITH GRAPH REPRESENTATION LEARNING AND GRAPH CLASSIFICATION** - Yi Qu, Shuyang Peng, Muyang Li and Yong Shi;

5. **THE SPATIOTEMPORAL EVOLUTION CHARACTERISTICS AND SPATIAL MISALIGNMENT ANALYSIS OF CHINA'S HEALTHCARE RESOURCE ALLOCATION EFFICIENCY** - Ni Yang, Wei Xu and Mincong Tang;

6. **AI-ASSISTED AUTOMATION OF STUDENT PRACTICE PLACEMENT ALLOCATION UNDER LEGISLATIVE CONSTRAINTS** - Laurentiu-Gabriel Dinca, Vlad Diaconita

– SECTION 5 –

Artificial Intelligence, Machine Learning and Predictive Analytics

This section brings together contributions focused on the development and application of artificial intelligence and machine learning techniques for predictive modeling and data-driven analysis. The papers cover a wide range of approaches, including explainable machine learning, deep learning, time-series forecasting, natural language processing, and graph-based methods, highlighting the growing importance of interpretability and performance in AI systems.
The contributions address diverse application domains such as financial behavior analysis, energy systems, social media and text analytics, video processing, project management, and educational platforms. In addition, the section includes research on AI model evaluation, MLOps frameworks, and emerging paradigms such as quantum-aware decision systems. Collectively, these works emphasize the role of advanced AI techniques in improving prediction accuracy, supporting decision-making, and enabling scalable and adaptable intelligent systems across various domains.

Friday, 8th May, 09:00 – 12:00, Room: 102
Chairman Gheorghe Cosmin Silaghi, Secretary: Sven Gal

1. **EXPLAINABLE MACHINE LEARNING FOR FINANCIAL BEHAVIOR CLUSTERING OF ROMANIAN FIRMS: AN XAI-DRIVEN APPROACH** - Adriana Aiftincai and Mihaela Muntean;

2. **AI-DRIVEN DEMAND RESPONSE FOR OVERVOLTAGE PREVENTION IN PROSUMER NETWORKS** - Andreea-Mihaela Niculae, Sebastián Madrigal, Antoni Morell, Ramon Vilanova, Jose Vicario and Adela Bâra;

3. **ASPECT-BASED SENTIMENT ANALYSIS OF ROMANIAN GUESTHOUSE REVIEWS: A LEXICON-BASED APPROACH** - Roxana Dogaru;

4. **A DECISION FRAMEWORK FOR PARADIGM-AWARE QUANTUM CODE GENERATION IN AUTONOMOUS AGENT SYSTEMS** - Teodor Cervinski, Cristian Toma, Madalina Zurini, Claudiu Brandas and Luciana Morogan;

5. **REAL-TIME BROADCAST VIDEO ANALYSIS: A MULTI-MODEL PIPELINE INTEGRATING ZERO-SHOT OCR, TEMPLATE CLASSIFICATION, AND NEURAL NAMED ENTITY RECOGNITION** - Adrian Vintila and Constanta Nicoleta Bodea;

6. **MACHINE LEARNING AND MULTI-TASK LEARNING APPROACHES TO PREDICTING COST AND DELAYS IN AGILE IT PROJECTS** - Diana Petre, Andrei Albu, Otniel Didraga and Marian Dardala;

7. **A SECURE SELF-HOSTED FILE BROWSER FOR AUTOMATED IMAGE CLASSIFICATION WITH CONTINUOUS LOCAL TRAINING AND DATA SOVEREIGNTY** - Marius Ioan Rusu and Simona Vasilica Oprea;

8. **BENCHMARKING XGBOOST, LSTM, AND CHRONOS FOR ONE-HOUR-AHEAD COMMERCIAL BUILDING ENERGY FORECASTING** - Nicușor-Andrei Andrei and Șener Ali;

9. **NOTES ON AMBIGUITY CLASSIFICATION OF POLITICAL CONTENT USING DIFFERENTIAL SHAPLEY FEATURE SELECTION** - Sven-Alexander Gal and Rodica-Ioana Lung;

10. **THE INFLUENCE OF TECHNOLOGICAL INNOVATION, GEOPOLITICAL RISK, AND UNCERTAINTY ON FINANCIAL MARKET PERFORMANCE IN THE SEMICONDUCTOR INDUSTRY** - Lavinia Roxana Toma, Catalina Lucia Cocianu, Cristian Razvan Uscatu and Sorin Muraru;

11. **ABOUT CODEBERT GENERALIZATION POWER FOR DETECTING AI-GENERATED CODE ACROSS UNSEEN LANGUAGES AND DOMAINS** - Diana Gabriela Sician and Gheorghe Cosmin Silaghi;

12. **COORDINATING MLOPS RETRAINING ACROSS AI FRAUD DETECTION MICROSERVICES: A SAGA-BASED APPROACH** - Andreea Traistaru, Cristina Radu, Pavel-Cristian Craciun and Robert-Cristian Necula;

13. **LDA-BASED TOPIC MODELING FOR PERSONALIZED SEQUENTIAL LEARNING PATH RECOMMENDATIONS IN MOOCS** - Gyöngyvér-Emese Kovacs;

14. **BRIDGING AI READINESS AND HUMAN DEVELOPMENT: THE ROLE OF ECONOMIC PERFORMANCE AND INNOVATION INVESTMENT** - Cristina Bota-Avram, Andreea Ciomag, Nicoleta Maria Ienciu and Liana Stanca;

15. **CLASSICAL VS. MACHINE LEARNING FORECASTING FOR BLOCKCHAIN CARBON ASSETS: A COMPARATIVE STUDY OF BCT AND NCT** – Gabriela Mariuțac, Mihai Pleșa, Iris Reychav, Roger Mchaney;

– SECTION 6 –

Generative AI, Large Language Models and Organizational Transformation

This section brings together contributions exploring the transformative role of generative artificial intelligence and large language models (LLMs) across organizational, educational, and societal contexts. The papers address key topics such as AI-driven decision-making, credibility and bias in LLM outputs, prompt engineering, and the integration of generative AI into business intelligence and process management frameworks.
The contributions span diverse application domains, including innovation ecosystem management, education and assessment systems, public sector processes, smart mobility, and labor market dynamics. In addition, the section highlights emerging challenges related to fairness, transparency, governance, and sustainability, including demographic bias, Green AI architectures, and regulatory constraints. Collectively, these works emphasize the profound impact of generative AI on organizational transformation, human–AI interaction, and the redesign of socio-economic systems in the digital era.

Thursday, 7th May, 14:00 – 18:00, Room: 127
Chairman: Valerică Greavu-Șerban, Secretary: Andreea-Iuliana Ghimiciu

1. **ARTIFICIAL INTELLIGENCE AND LARGE LANGUAGE MODELS AS A COGNITIVE LAYER IN INNOVATION ECOSYSTEM MANAGEMENT** - Yuriy Kuznetsov, Margarita Bogdanova, Evelina Parashkevova-Velikova and Marusya Smokova-Stefanova;

2. **BEYOND ACCURACY: A CREDIBILITY ASSESSMENT FRAMEWORK FOR LARGE LANGUAGE MODELS IN ENTERPRISE BUSINESS INTELLIGENCE** - Anca Andreescu and Alin-Gabriel Vaduva;

3. **ALGORITHMIC DIPLOMACY AS AN EVOLVING PARADIGM OF CYBER DIPLOMACY: A STUDY OF THE LITERATURE ON ALGORITHMIC DIPLOMACY** - Ioana Vasiloiu;

4. **A PROMPT-ORIENTED FRAMEWORK FOR ASSESSING SECURITY VULNERABILITIES IN LLM-GENERATED CODE** - Constantin-Eduard Turcu and Gabriela Meșniță;

5. **THE IMPACT OF ARTIFICIAL INTELLIGENCE ON DECISION-MAKING PROCESSES IN ORGANIZATIONS: COGNITIVE BIAS VS. ALGORITHMIC BIAS** - Marian Stoica, Andreea-Iuliana Ghimiciu, Bogdan Ghilic-Micu and Marinela Mircea;

6. **AI-DRIVEN ACADEMIC ASSESSMENT APPLICATION** - Florin-Răzvan Soare;

7. **AUDITING DEMOGRAPHIC BIAS IN LLM-BASED ESSAY SCORING** - Andreea-Maria Tanasă, Denisa-Maria Iordache and Cristina Iancu;

8. **CIRCULAR ECONOMY ALIGNED GREEN AI ARCHITECTURES: FEASIBILITY AND REAL-WORLD BENEFITS** - Alexandru-Bogdan Ivanescu and Razvan Daniel Zota;

9. **ARTIFICIAL INTELLIGENCE: THEORETICAL FOUNDATIONS AND ECONOMIC APPLICATIONS IN THE CONTEXT OF GLOBAL DIGITAL TRANSFORMATION** - Cristian Mesaros and Sergiu Jecan;

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ABSTRACTS

Data Analytics, IoT and Emerging Digital Infrastructures

DATABASE ARCHITECTURES AND DATA INTEROPERABILITY IN CLINICAL DECISION SUPPORT SYSTEMS: A BIBLIOMETRIC ANALYSIS

Iulian-Ionut **CIOBANU**, *Alexandru Ioan Cuza University of Iasi*

Abstract: *This paper examines the role of database architectures and data interoperability in supporting clinical decision support systems through a bibliometric analysis of academic literature. Using publications retrieved from the Web of Science, the study analyzes a dataset of 345 articles and review papers published between 2015 and 2026. The analysis explores publication trends, identifies the most influential contributions, examines patterns of international research collaboration, and investigates the thematic structure of the field through keyword frequency and co-occurrence analysis conducted using VOSviewer. The results indicate a substantial increase in research interest in recent years, with a strong concentration of scientific output in the United States and several European countries. Citation analysis shows that the intellectual foundation of the field is shaped by influential studies on mobile health, semantic interoperability, electronic health records, artificial intelligence in medicine, and data-driven clinical decision support. The keyword co-occurrence analysis reveals six interconnected thematic clusters centered on semantic interoperability, health information systems, technical standards, digital health applications, artificial intelligence, and biomedical data integration. This study contributes by providing a structured bibliometric mapping of research on database architectures and data interoperability in clinical decision support systems and by identifying the main thematic clusters shaping the current research landscape. The findings provide a clearer understanding of the technological foundations supporting clinical decision support and point to emerging research directions related to semantic interoperability, federated data environments, and precision medicine-oriented decision support systems.*

Keywords: *clinical decision support, interoperability, database architecture*

DATA SOURCES IN OPEN FOOTBALL ANALYTICS: BROAD POSITION CLASSIFICATION WITH THE FBREF AND TRANSFERMARKT DATASETS

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Marin **FOTACHE**, *Alexandru Ioan Cuza University of Iasi*

Abstract: *Public football datasets differ not only in size, but in what they preserve of player behavior. This study benchmarks the FBref and Transfermarkt datasets for broad outfield position classification under a shared pipeline: same split strategy, preprocessing logic, candidate learners, and tuning budget. The comparison is designed to examine source-level representational depth without changing the modeling pipeline. The performance gap between sources emerged before tuning and persisted through it, at a magnitude several times larger than any difference between learner families within either source. The gap is concentrated at the midfielder boundary: FBref retains enough territorial, progression, and defensive signal to separate that class reliably, while Transfermarkt reduces players to output totals that collapse the midfielder profile into its neighbors. Permutation importance confirms that the two sources do not merely differ in feature count—they encode fundamentally different aspects of how players participate in a match.*

Keywords: *Football Analytics, Open Data, Player Position, Classification, Sports Analytics, Transfermarkt, FBref*

FROM EVENT LOGS TO INSIGHT: A COMPARATIVE PROCESS MINING ANALYSIS OF HOSPITAL BILLING

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Cristina-Claudia **OSMAN**, *Babeș-Bolyai University*
Miranda-Petronella **VLAD**, *Babeș-Bolyai University*

Abstract: *Administrative processes in healthcare, particularly hospital billing, are characterized by high variability, manual workarounds and frequent rework loops, all of which reduce transparency and operational efficiency. As hospitals increasingly rely on ERP and HIS platforms, large volumes of event data become available; however, organizations often lack end-to-end visibility into their actual processes. This paper applies process mining to the Hospital Billing benchmark event log and compares three discovery algorithms, Alpha Miner, Inductive Miner and Heuristics Miner, across two popular environments, ProM and PM4Py. We evaluate the discovered models using standard quality*

dimensions and analyze the impact of data quality and tool design on conformance results. Our findings show that Alpha Miner collapses into underfitting "flower" models on this dataset, Inductive Miner yields sound but generalized models with excellent fitness and moderate precision, while Heuristics Miner (PM4Py) balances fitness and precision effectively but may require careful configuration in ProM. The comparative evaluation illustrates the importance of tool selection when analyzing real-world healthcare processes and highlights the relevance of preprocessing for obtaining reliable analytical results.

Keywords: *Process Mining, Hospital Billing. Alpha Miner, Inductive Miner, Heuristics Miner, Petri Nets, Conformance Checking*

PERFORMANCE ANALYSIS FOR IN-PROCESS DATABASES. CASE STUDY: DUCKDB

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Abstract: *In-process database systems are an increasingly popular solution addressing the growing demand for fast and efficient analytical processing. DuckDB is a major contender in this class, due to its ability to support complex analytical workloads with high performance in locals, affordable and open-source OLAP architectures. This study presents an experimental framework for evaluating the performance, scalability, and limitations of DuckDB using. A set of 210 queries was designed with a large degree of variability, such as filtering, joins and aggregations. The experiments were conducted using the TPC-H benchmark at multiple scale factors (1GB, 3GB, 10GB, 100GB, and 200GB) and different timeout thresholds (10 and 30 minutes). Response times and execution outcomes (if query was completed within the allocated timeout) were collected and analyzed using statistical methods to identify performance variations and scalability patterns. The results show that DuckDB provides high performance for analytical queries and maintains good scalability. However, performance limitations were observed in highly complex query scenarios.*

Keywords: *DuckDB, TPC-H benchmark, In-process databases, OLAP*

MAPPING HAPPINESS IN TURKISH TWEETS

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Abstract: *Understanding happiness has usually relied on global life- satisfac-tion measures and retrospective self-reports, which often overlook how happiness can be discovered. We explored daily used positive Turkish tweets for daily used happiness. The analysis uses the publicly available TurkishTweets dataset, consisting of 4,000 Turkish tweets labelled across five emotional categories, focusing on 800 tweets labelled as "happy." After preprocessing, tweets were represented using TF–IDF vectorization and analysed with k-means clustering to identify thematic patterns. UMAP was applied to reduce dimensionality and for visualisation, and a rule-based procedure extracted frequently occurring verb-centred experiential expressions. Results show that happy tweets form multiple micro-experiential themes rather than a single category, including humour, gratitude, celebration, expressions of well-being, enjoyable activities, and affection. Action-oriented expressions such as "laughed," "enjoyed," and "felt great" recur as indicators of everyday happiness, suggesting that happiness in Turkish digital discourse is shaped by multidimensional experiences rather than generalised positivity.of everyday happiness, suggesting that happiness in Turkish digital discourse is shaped by multidimensional experiences rather than generalized positivity.*

Keywords: *Micro-happiness, Social Media Analytics, Turkish Tweets, Digital Well-being*

A SECURE WEB-BASED REMOTE-CONTROL FRAMEWORK FOR FANUC INDUSTRIAL ROBOTS

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Bogdan **IANCU**, *Bucharest University of Economic Studies*

Abstract: *This study examines the implementation and security of a remote-control system for FANUC industrial robots. The architecture has 2 main components. The first one is a user-facing web application built in .NET Core. The second layer is composed of Karel and Teaching Pendant (TP) and represents the robot component. Communication between the two layers is performed through a TCP/IP socket connection. Security analysis across the TCP channel, web server, and web application revealed that end-to-end transport encryption on the robot side is not achievable with the know constraints of the Karel language. Therefore, a compensating strategy based on network isolation and gateway*

hardening is proposed and evaluated against cybersecurity practices. The study further considers the suitability of this architecture in laboratory and pharmaceutical environments, where industrial robotic systems operate under stricter requirements for traceability, data quality, and controlled access. In this context, the web-based control layer goes beyond a simple interface, acting as a main point for authentication, authorization, and audit logging. This demonstrates that, despite the constraints at the controller level, legacy industrial robots can be integrated into more secure and accountable frameworks suitable for regulated environments.

Keywords: *FANUC, Karel, IoT, industrial robots, cybersecurity, pharmaceutical automation*

DEPENDENCY AMPLIFICATION IN DISTRIBUTED ORDERING: CAUSALITY LIMITATIONS UNDER SUB-EXPONENTIAL IOT NETWORK CONDITIONS

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Abstract: *Causal and total orderings are critical for ensuring consistency, reliability and correct sequencing of events in distributed IoT networks. Existing evaluations typically assume light-tailed network delays, overlooking the impact of heavy-tailed latency observed in real-world IoT deployments. In this paper, we show that under lognormal network jitter and heterogeneous workloads, causal ordering exhibits a fundamental vulnerability: tail-latency amplification driven by dependency chains. Using a probabilistic model combining Zipf-distributed Poisson arrivals and heavy-tailed delays, we demonstrate that latency is dominated by the slowest dependency, leading to severe p99 degradation. We identify a crossover point at which total ordering provides lower tail latency despite its centralized bottleneck. Our results qualify the conventional assumptions and highlight the need to employ ordering approaches that explicitly account for tail behavior.*

Keywords: *causal and total distributed orderings, IoT consistency reliability and event-sequencing, sub-exponential network conditions, dependency amplification*

DESIGNING MIXED REALITY EXPERIMENTS FOR NEXT GENERATION OF SCIENTISTS AND ENGINEERS. TRANSITIONING FROM THE LABORATORY ENVIRONMENT TO REAL-WORLD USE CASES

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Iulian **FURDU**, *Vasile Alecsandri University of Bacau*
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Abstract: *This research aims at presenting two situational scenarios that apply the technologies of mixed reality in teaching, within the laboratory environment. On the one hand, a set of characteristics were identified within the immersive technologies laboratory, carried out together with 2nd year engineering master's students. On the other hand, the multitude of .NET multiplatform applications existing on GitHub platforms, based on C# for virtual and augmented reality allows us to orient them in various fields. The social importance of educational applications has directed us towards new developments for new scenarios. This paper aims to describe and analyze the development process of a mixed reality application for the visualization of technical research simulated scenarios. The study has been conducted by means of Microsoft HoloLens 2 and the subsequent IDEs and development platforms. An additional scenario has been conducted by creating a virtual classroom within the International Space Station, by means of HTC VIVE PRO virtual reality headsets.*

Keywords: *Mixed Reality, HoloLens 2, Augmented Reality, Immersive Technologies, International Space Station*

FROM OBSERVATION TO LABEL: AUTOMATING PRIVACY ASSESSMENT OF IOT DEVICES USING PACKET SNIFFING

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Catalin **BOJA**, *Bucharest University of Economic Studies*

Abstract: *This research aims at presenting two situational scenarios that apply the technologies of mixed reality in teaching, within the laboratory environment. On the one hand, a set of characteristics were identified within the immersive technologies laboratory, carried out together with 2nd year engineering master's students. On the other hand, the multitude of .NET multiplatform applications existing on GitHub platforms, based on C# for virtual and augmented reality allows us to orient them in various fields. The social importance of educational*

applications has directed us towards new developments for new scenarios. This paper aims to describe and analyze the development process of a mixed reality application for the visualization of technical research simulated scenarios. The study has been conducted by means of Microsoft HoloLens 2 and the subsequent IDEs and development platforms. An additional scenario has been conducted by creating a virtual classroom within the International Space Station, by means of HTC VIVE PRO virtual reality headsets.

Keywords: *IoT, Privacy, Data Governance, Automation, Labelling*

AN OPTIMIZATION MODEL FOR IOT SYSTEM PROCUREMENT IN ELDERLY MONITORING

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Marius **RADULESCU**, *Gheorghe Mihoc-Caius Iacob" Institute of Mathematical Statistics and Applied Mathematics of the Romanian Academy*
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Abstract: *The rapid expansion of Internet of Things (IoT) technologies in healthcare has created new opportunities to improve the quality of life for older adults through continuous remote monitoring. However, procuring an optimal IoT system for elderly monitoring is a complex decision-making problem involving competing technical, economic, operational, and safety criteria. This paper proposes a binary programming optimization model for the hardware procurement of IoT-based elderly monitoring systems. The system architecture comprises nine hardware sub-systems covering vital-sign sensing, motion/fall detection, environmental monitoring, communication, data processing, power, and security functions. The model formulates a weighted multi-objective function that simultaneously minimizes total procurement cost and power consumption. It incorporates a comprehensive set of constraints, including budget limits, power budgets, sensor performance requirements, component compatibility, supplier diversification, communication redundancy, battery lifetime, and data throughput. A numerical case study involving three representative subsystems illustrates the model and demonstrates its ability to identify cost-effective and safety-compliant hardware configurations.*

Keywords: *Internet of Things, elderly monitoring, hardware procurement, binary programming, multi-objective optimization, wearable sensors, healthcare IoT*

A CONCEPTUAL FRAMEWORK FOR SECURE AUTONOMOUS PAYMENTS IN RETAIL IOT: THE CONTEXTUAL ZERO-TRUST (CS-ZT) APPROACH

Alisa **HARKAI**, *Bucharest University of Economic Studies*
Cristian Eugen **CIUREA**, *Bucharest University of Economic Studies*
Lorena **BATAGAN**, *Bucharest University of Economic Studies*

Abstract: *The rapid expansion of the Internet of Things (IoT) in the retail sector has paved the way for autonomous supply systems, yet securing automated transactions remains a critical challenge. Conventional security models often rely on centralized cloud verification, which introduces latency and increases the attack surface for sensitive financial data. This paper proposes the Contextual Security - Zero Trust (CS-ZT) framework, a novel conceptual approach designed to secure autonomous payments at the network edge. Unlike traditional methods, the CS-ZT model integrates physical contextual signals with cryptographic validation, establishing a trust anchor at the network edge to ensure transaction integrity. By shifting the decision-making process to an Edge Computing node, the framework minimizes data exposure and mitigates common vulnerabilities such as replay attacks, man-in-the-middle interceptions, and physical tampering. The framework is substantiated through a detailed architectural design and a formal threat analysis, demonstrating a robust methodology for correlating physical events with digital payment triggers. This research lays the foundation for decentralized, privacy-preserving autonomous retail environments, providing a scalable blueprint for future implementations in smart homes and automated warehousing.*

Keywords: *IoT Security, Zero Trust, Edge Computing, Autonomous Payments, Retail Automation, Context-Aware Systems*

A CONCEPTUAL FRAMEWORK FOR THE DIGITALIZATION OF MUSICAL PROJECTS IN THE DIGITAL ECONOMY

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Mircea **GEORGESCU**, *Alexandru Ioan Cuza University of Iași*

Abstract: *The way that cultural and creative industries work in the last years has fundamentally changed in the context of digitalization, a process that reshaped how musical projects are developed, managed and brought to audiences. Yet despite a substantial and growing body of research on digital platforms, streaming ecosystems and technological innovation in music, the field remains surprisingly fragmented, as most studies illuminate one corner of the picture*

while leaving the rest in shadow. This paper proposes a five-layer conceptual framework for the digitalization of musical projects, developed within the context of the digital economy. The framework draws on prior systematic and bibliometric reviews by the authors [1, 2] and integrates actors, business processes, technological infrastructure, data flows and decision-making mechanisms into a unified, system-oriented model. Musical projects are treated not as static artistic outputs but as dynamic, data-driven ecosystems with a continuous lifecycle spanning planning, content management, distribution, audience engagement, monetization and iterative optimization. Three theoretical propositions are advanced concerning data-driven feedback, actor interdependence and lifecycle continuity. The model is intentionally adaptable, for it was thought in order to be applicable to commercial ventures, hybrid initiatives and non-profit cultural projects alike, and is offered as a foundation for both further theoretical development and practical implementation in the field of Business Information Systems.

Keywords: *digital musical projects, digital economy, conceptual framework, business process modelling*

PROCESS MODELING OF EDITORIAL WORKFLOWS IN A UNIVERSITY PRESS: A BPMN-BASED APPROACH

Vasile **MORARU**, *Babes-Bolyai University*

Abstract: *Editorial activity within university presses involves the coordination of a complex set of organizational processes that include both editorial activities and administrative and economic procedures. In this context, business process modeling can serve as a useful instrument for analyzing and representing the activity flows that structure editorial work. This article presents an analysis of editorial processes within a university press using Business Process Modeling techniques. The research is based on a case study and employs BPMN 2.0 (Business Process Model and Notation) to represent operational workflows, as well as the SAP Signavio platform for process modeling. The modeling was conducted on two levels of representation: a conceptual process architecture diagram providing an overview of the main editorial processes, and detailed BPMN diagrams representing operational workflows. The analysis highlights the central role of the cost estimation and project configuration process in structuring the editorial workflow, as well as the relationships between editorial processes and the administrative processes that support publishing activities. The results indicate that process modeling can contribute to a better understanding of how editorial activities are organized and can provide an analytical framework for documenting and analyzing organizational workflows in cultural institutions.*

Keywords: *Business Process Modeling, BPMN, editorial workflows, university press, process architecture, SAP Signavio*

Digital Transformation, Smart Business and Sustainable Communities

ORGANIZATIONAL CULTURE AS A MEDIATOR: DIGITAL TRANSFORMATION, AI ADOPTION, AND EMPLOYEE MOTIVATION IN THE ROMANIAN PUBLIC SECTOR

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Abstract: *Digital transformation (DT) and artificial intelligence (AI) adoption have become strategic priorities in public administration, yet their motivational effects remain insufficiently explored in contexts marked by institutional rigidity, such as Romania. This study examines the relationships between DT, AI adoption, organizational culture (OC), resistance to change (RC), digital skills (DS) and employee motivation (EM) in Romanian public institutions, testing a moderated mediation structural model. Data were gathered through a structured questionnaire administered to 720 public employees from central, local and deconcentrated administration (May–September 2025), with analyses conducted in R (multiple regression, bootstrap mediation, moderation, K-means clustering). Results indicate moderate DT and AI levels ($M \approx 3.29/5$), with positive effects on both OC ($R^2 = 0.617$) and EM ($R^2 = 0.333$), AI showing greater influence than DT. Organizational culture emerges as the dominant mediator of the DT→EM relationship (91.3% mediated proportion; ACME = 0.416, $p < 0.001$), while RC negatively moderates these effects. Three employee profiles are identified: Champions, Resistants and Adaptives. The findings confirm that technological investments do not produce sustainable motivation without deliberate cultural change, pointing to the need for integrated change management, digital skills training and ethical AI governance aligned with the EU Digital Decade 2030.*

Keywords: *digital transformation, AI adoption, organizational culture, employee motivation, moderated mediation*

KNOWLEDGE GRAPHS AS THE SEMANTIC FRAME FOR DESIGN THINKING KNOWLEDGE MANAGEMENT SYSTEM: A HEALTHCARE FEASIBILITY CASE

Anca **MOLDOVAN**, *Babeș-Bolyai University*

Abstract: *Design Thinking (DT), a widely adopted approach for innovation, problem framing, and stakeholder-centered solution development, typically rely on collaborative workshops that generate diverse intermediate artifacts: personas, empathy maps, customer or patient journeys, problem statements, ideation clusters, and prototypes. Although these artifacts support co-creation and decision-making in situ, they are often poorly structured from a knowledge management perspective, which limits their semantic traceability, retrospective analysis, and systematic reuse across projects and organization-al contexts. This work addresses such limitations through a Design Science Research approach that proposes a model-driven treatment to produce a Knowledge Graph (KG) for the practice of Design Thinking. The proposed artifact is intended to externalize the tacit conceptual structures underlying DT practice and to capture workshop elements in a machine-readable, semantically integrated form that can be afterwards leveraged in knowledge management systems. Specifically, the approach supports the representation of stakeholder profiles, empathy-related insights, problem framing, idea generation out-comes, preference expressions, and prototype-related content within a coherent semantic structure. This Design Science proposition is instantiated in this paper through a case-based example from the healthcare domain to show-case feasibility as a preliminary evaluation step, as required by the Design Science research process. The proposal thus positions DT not only as a facilitation method, but also as a cumulative organizational knowledge capability.*

Keywords: *Design Thinking, Design Science, Knowledge Graphs, Participatory Ideation, Stakeholders Mapping, Patient Journey*

IDENTIFYING THE DETERMINANTS OF STARTUP SCALABILITY USING MACHINE LEARNING TECHNIQUES: A COMPARATIVE STUDY ON GROWTH BARRIERS IN ROMANIA

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Stelian **STANCU**, *Bucharest University of Economic Studies*

Abstract: *Startups in emerging economies often launch successfully only to hit a growth ceiling, a systemic challenge known as the "missing middle." This research investigates what actually drives scalability in high-impact ventures, focusing specifically on diagnosing the structural barriers holding back the Romanian tech ecosystem. A common flaw in entrepreneurial studies is survival bias. To counter this, we rely on a granular dataset from a global entrepreneurial organization that includes both successful global champions and rejected applicants, covering roughly 900 companies and over 2,600 founders. The analytical approach directly connects the micro and macro levels.*

We combine company level data, such as financial metrics, team dynamics, with broader World Bank indicators, including inflation, private credit access, and corruption indices. By comparing ensemble Machine Learning models (Decision Trees, Random Forest, XGBoost, and Stacking Classifiers), the goal is to build an accurate quantitative profile of a highly scalable enterprise. Rather than just predicting success, the study opens the algorithmic black box using Explainable AI (SHAP). This step is crucial for isolating the exact impact of latent variables like "Entrepreneur Pedigree" and "Macro-Stability". When we project the Romanian cohort against this global baseline, the specific friction points preventing local startups from competing internationally become mathematically clear. Ultimately, this work delivers a structured framework for evaluating the Romanian entrepreneurial ecosystem, mapping its performance and structural hurdles against a rigorous global standard.

Keywords: *Machine Learning, Explainable AI, High-Impact Entrepreneurship, Predictive Modeling, Structural Disparities*

UNCOVERING CONSUMER DISCUSSIONS ON SOCIAL MEDIA: EVIDENCE FROM YOUTUBE COMMENTS

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Andrei-Octavian **MĂLAN**, *Babeș-Bolyai University*
Dan-Andrei Sitar-**TĂUT**, *Babeș-Bolyai University*

Abstract: *In today's social media environment, online platforms have become a place where users frequently engage with brands, evaluate products and react to brand-related content. This research aims to assess online discussions, in the form of comments, regarding reputable brands in the context of consumer electronics on YouTube. Topic modeling and sentiment analysis techniques were applied, which revealed four main topics, namely user experience and features, technological innovation, customer feedback, and product characteristics, while sentiment analysis revealed emotions, such as joy and a slight presence of critical reactions. From a theoretical perspective, functional topics were identified, which means that digital interactions create discussions about product specifications, functionalities, and experience in a positive and funny way. Practical insights provide evidence about how companies and marketers can leverage communication strategies that imply performance improvement. Due to the presence of anger across some topics, brands should monitor users' feedback and adopt specific customer support strategies in order to address ongoing concerns.*

Keywords: *social media, YouTube, topic modeling, sentiment analysis*

PROCESS MINING MEETS INSTITUTIONAL REALITY: DIGITAL PROCES TWINS IN UNIVERSITY ADMINISTRATION

Larisa-Elena **STÂNGACIU**, *Alexandru Ioan Cuza University*
Mircea Radu **GEORGESCU**, *Alexandru Ioan Cuza University*

Abstract: *Digital transformation discussions in higher education have largely stalled at the stage of digitization, particularly in relation to administrative processes. Despite their operational importance and institutional complexity, these processes remain underexplored from a technical and process-modelling perspective. In this context, the present study investigates whether a Digital Process Twin (DPT) can be implemented for university administrative processes. The study adopts a mixed qualitative approach. It combines inductive coding of a purposively selected corpus of 13 academic papers with hybrid coding of three expert interviews conducted with university faculty specializing in databases, cloud computing, and business processes. From the literature, seven key themes are identified: event log infrastructure, DPT architecture, process discovery and simulation, human factors and social complexity, public and educational administration, AI and automation, and agent-based socio-technical modelling. Expert perspectives largely confirm this pipeline while also extending it to include institutional and governance dimensions that are not sufficiently addressed in the literature. In addition, eight new inductive feasibility conditions emerge exclusively from the expert interviews. Overall, the findings indicate that while the DPT pipeline is conceptually coherent, it remains institutionally premature. Technical readiness alone is insufficient; successful implementation also depends on addressing the organizational and socio-technical preconditions identified in this study.*

Keywords: *Digital Process Twin, Process Mining, University Administrative Process*

EMBEDDING ROUTE OPTIMIZATION IN ERP SYSTEMS: A DESIGN-SCIENCE ARTIFACT FOR DIGITAL COMMERCE LOGISTICS

Florina Livia **COVACI**, *"Babeș-Bolyai" University*
Bianca **PASCU**, *"Babeș-Bolyai" University*
George Sebastian **CHIS**, *"Babeș-Bolyai" University*

Abstract: *This paper addresses the design and deployment of an ERP-integrated routing service for digital commerce fulfilment. Using a design-science*

approach, we build an artifact that couples a travel-time matrix with a reusable constraint validator (capacities, shifts, and client-preferred windows) and a dual-heuristic planner instantiating Clarke–Wright Savings(CWS) and Greedy Nearest-Neighbour algorithms(GNN). Analytically, we evaluate the artifact across urban, suburban, and rural scenarios, reporting distance, on-time adherence and examining sensitivity to capacity ratios and time-window tightness. Technologically, we design a modular architecture suitable for ERP extension, enabling generalizable deployment in digital commerce settings. The paper contributes: (i) a dual-optimization framework for embedding route-planning intelligence into enterprise systems; and (ii) empirical evidence on the trade-offs among travel-distance minimization, delivery punctuality, and overall route efficiency, thereby supporting algorithm selection in line with specific logistical priorities. Through an in-depth analysis of the dual-optimization framework and its implementation strategies, the study highlights its practical implications for algorithm selection and performance management in line with specific logistical priorities. The CWS algorithm demonstrated superior performance in minimizing total travel distance, although this advantage may be accompanied by reduced compliance with time-window constraints and increased computational complexity. In contrast, the GNN algorithm offered a more computationally efficient and simpler alternative, achieving a favourable balance between solution quality and execution time. These characteristics make GNN particularly suitable for dynamic, real-time route planning applications.

Keywords: *Digital commerce logistics, Vehicle routing with time windows, Design-science research, ERP integration, Algorithmic governance*

DESIGN THINKING FOR GREEN DIGITAL TRANSFORMATION: EMPIRICAL EVIDENCE ON DIGITAL INTENSITY AND SUSTAINABLE PRACTICES IN EUROPEAN ENTERPRISES

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Ana-Maria **CONSTANTINESCU**, *"Lucian Blaga" University*
Radu-Anton **MOLDOVAN**, *"Lucian Blaga" University*
Dumitru Alexandru **MARA**, *"Lucian Blaga" University*

Abstract: *This study examines the intersection of Design Thinking (DT) and sustainable digital transformation, proposing that a human-centered, iterative methodology can bridge the gap between digital economic activity and environmental responsibility. Using aggregate data from the European Statistical Office (EUROSTAT), we empirically test two hypotheses: (H1) that e-commerce platforms integrating design-led sustainability features exhibit higher rates of sustainable consumer purchases; and (H2) that enterprises with higher digital intensity are more likely to implement Green ICT practices. Employing*

Spearman's rank-order correlation and multiple linear regression via IBM SPSS Statistics, the analysis reveals a statistically significant positive correlation between digital intensity and general environmental measures ($\rho = 0.411$, $p = 0.016$). However, no significant relationship is confirmed between e-commerce activity and enterprise-level environmental ICT consideration. The regression model, while overall statistically significant ($F = 3.791$, $p = 0.015$), highlights digital intensity as the dominant near-significant predictor of individual internet purchasing. These mixed findings indicate that while digital adoption enables some sustainability efforts, deliberate design-led interventions remain necessary to close the gap between digital growth and concrete environmental outcomes. The study contributes to the growing literature on sustainable digital transformation and offers implications for policymakers and digital platform designers.

Keywords: *Design Thinking, Sustainable Digital Transformation, Green ICT, E-commerce, Digital Intensity*

A REPRODUCIBLE AND EXPLAINABLE MCDA-BASED FRAMEWORK FOR ERP PRE-SELECTION IN SIMULATED DECISION SCENARIOS

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Alin Grig **MIHIS**, *Babes-Bolyai University of Cluj-Napoca*
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Abstract: *Selecting an Enterprise Resource Planning system remains a difficult multi-criteria decision problem, especially in early-stage evaluation contexts where access to full enterprise implementations is limited and comparative analysis must rely on incomplete or constrained information. This paper proposes a reproducible and explainable framework for ERP pre-selection based on Multi-Criteria Decision Analysis and simulated decision scenarios. The proposed approach combines four components: anonymized ERP alternatives, criterion-based scoring, weighted additive ranking and rule-based explanation supported by sensitivity analysis. Unlike full-scale commercial benchmarking studies, the framework is designed for constrained-access contexts such as exploratory screening, educational settings and preliminary SME-oriented evaluation. To illustrate the model, we construct a controlled simulation dataset involving four ERP alternatives and six evaluation criteria: functional coverage, implementation feasibility, scalability, usability, integration capability and vendor support reliability. A weighted additive model is applied to generate the baseline ranking, followed by alternative weighting*

scenarios in order to test result stability. The findings show that the proposed framework supports transparent ranking, identifies the criteria that drive the final outcome and enables structured justification of the selected alternative. The paper contributes a reproducible and methodologically clear pre-selection model that integrates MCDA-based ranking with rule-based explainability in a simulation-based business informatics setting. An accompanying interactive tool supports reproducibility and transparent exploration of weighting scenarios.

Keywords: *ERP selection, MCDA, decision support systems, explainable decision support, scenario analysis, reproducibility*

DECODING AI RECOMMENDATIONS: TOWARD A CONCEPTUAL S-O-R MODEL OF PERSONALIZATION, PRIVACY CYNICISM AND IMPULSE BUYING

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Abstract: *AI-driven recommendation systems increasingly shape shopping experiences on social media through predictive personalization. Although prior-research links personalization and AI recommendations to impulse buying, less is known about how algorithm awareness, privacy cynicism, and serendipity jointly influence this behavior. To address this gap, this paper proposes a conceptual research model grounded in the Stimulus-Organism-Response (S-O-R) framework, in which algorithmic filtering awareness, perceived recommendation personalization, and serendipity shape impulse buying through privacy cynicism and perceived utilitarian value. The paper contributes by positioning serendipity as a generator of utilitarian value and by integrating perceived recommendation personalization, algorithmic filtering awareness, and privacy cynicism into a consumer behavior framework of impulse buying. Although not yet empirically tested, the theoretically grounded model offers practical implications by highlighting the need for designers and marketers to balance recommendation accuracy with serendipity, while cautioning regulators and consumer-protection stakeholders that merely increasing users' awareness of algorithms could result in more, rather than less impulse buying as a consequence of privacy-related resignation. Finally, this paper advances six directional hypotheses for future empirical validation of the model, recommends operationalizations from established literature, and suggests PLS-SEM as an analytical approach.*

Keywords: *AI-driven recommendations, Impulse Buying, Privacy Cynicism, Algorithm Awareness, Serendipity, Social media commerce*

PLAY TO LEARN: TRANSFORMING COMPUTER SCIENCE EDUCATION THROUGH SERIOUS GAMES

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Abstract: *The importance of Computer Science education has increased over the last decade. On the other hand, students in this field often experience low motivation, reduced engagement, and high dropout rates, which can make it difficult for them to successfully complete Computer Science programs. Educators and researchers have acknowledged the issue and have experimented with multiple innovative teaching tools. One of them is Serious Games, defined as digital or physical games designed for purposes other than pure entertainment. In our literature review, we thoroughly analyzed 24 primary studies on Serious Games in Computer Science (CS) higher education. The findings highlight a variety of applications, particularly in programming education, with generally positive effects on engagement and understanding, although challenges related to design and integration persist. Moreover, the study assesses the perspectives of Economic Informatics faculty through a survey, providing insights into their views on Serious Games and their willingness to integrate them into their teaching practices.*

Keywords: *higher education, mandatory student practice, Bologna Process, workflow automation, design science research, convention matching, ethical AI, large language models, agentic AI*

AGRIEATS: A SERVERLESS MULTI-APPLICATION ECOSYSTEM FOR LOCAL FOOD SUPPLY CHAINS

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Abstract: *This paper introduces AgriEats, a multi-application digital ecosystem developed to modernize Romania's short food supply chains by directly linking local agricultural producers with urban consumers. The platform integrates four interconnected applications, AgriEats (consumer interface), AgriCon-sumer (producer management), AgriDelivery (courier operations) and Agri-Admin (administrative oversight), all built on a unified Firebase backend that enables real-time synchronization, serverless business logic and cross-platform mobile deployment using Angular and Ionic. The work is motivated by Romania's critical dietary and public health challenges, characterized by low fruit and vegetable consumption, high intake of processed foods and significant diet-related morbidity. Simultaneously, small-scale agricultural producers face limited market access and low digitalization, while consumers in metropolitan*

areas lack convenient access to fresh local products. AgriEats addresses these structural gaps by implementing automated courier dispatch through Cloud Functions, real-time delivery tracking with Leaflet maps, semantic product search, AI-powered conversational support via Dialogflow and a transparent pricing model based on distance-based delivery fees and platform commissions. The ecosystem demonstrates that a fully digitalized short food supply chain is technically feasible and operationally scalable. The study concludes that digital platforms like AgriEats can play a meaningful role in improving dietary accessibility, supporting small producers, reducing environmental impact through shorter transport distances and fostering community-centered food economies.

Keywords: *local food supply chain, serverless architecture, Firebase*

ADVANCING SMART AND SUSTAINABLE EV CHARGING INFRASTRUCTURE THROUGH ANALYTICS AND RENEWABLE ENERGY INTEGRATION

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Abstract: *The transition to electric mobility necessitates the development of an intelligent, efficient, and scalable charging infrastructure that integrates seamlessly with existing power grids while maximizing the use of renewable energy sources. The NEVERFLAT project addresses these challenges by introducing a cost-effective bidirectional charging ecosystem that supports Vehicle-to-Grid (V2G) and Vehicle-to-Load (V2L) functionalities. By leveraging artificial intelligence (AI)-driven predictive models, smart grid technologies, and Ambient IoT, the project aims to optimize energy management, enhance charging operations, and improve grid stability. A key innovation of NEVERFLAT is the integration of photovoltaic panels and battery energy storage systems (BESS) to reduce dependence on fossil fuels and improve energy flexibility. The implementation of real-time data analytics facilitates dynamic resource allocation, optimizing the placement of charging stations and reducing operational costs. The project introduces innovative business models and token-based data-sharing mechanisms, fostering a more accessible and economically viable EV charging market. The effectiveness of the proposed system is evaluated through pilot demonstrations in Germany, Romania, and Spain, analyzing its*

scalability, efficiency, and economic feasibility. Initial findings indicate that bidirectional charging, predictive analytics, and smart grid integration significantly enhance grid resilience, energy efficiency, and financial sustainability. This study provides an assessment of the NEVERFLAT initiative, focusing on the Romanian pilot implemented in Bucharest, detailing its technological innovations, energy optimization strategies, and implications for sustainable EV infrastructure development. By addressing key challenges, the project contributes to the advancement of smart, resilient, and user-centric EV charging ecosystems, supporting the transition to a low-carbon and energy-efficient transportation sector.

Keywords: *Smart Grid, Sustainable Infrastructure, Electric Vehicles*

SMART DISASTER MANAGEMENT

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Abstract: *The growing frequency and intensity of climate-related disasters, combined with the increasing interdependence of critical infrastructures, have exposed the limits of traditional disaster management models centered primarily on post-event response. In this context, the paper examines how the integration of artificial intelligence, Internet of Things technologies, open data, and predictive analytics can support the transition toward a smarter and more anticipatory disaster management paradigm. The study proposes the Integrated AI-Driven Disaster Response Architecture (IADRA), a layered conceptual framework structured around four core components: sensing and data acquisition, data processing and analytics, decision support, and economic impact modeling. In addition, the paper introduces the Smart Resilience Index (SRI), designed to capture the adaptive capacity of socio-technical systems by combining indicators of digital infrastructure readiness, institutional capacity, and economic agility. Methodologically, the article relies on open data sources, including EM-DAT, World Bank Open Data, KNMI Climate Explorer, and the Climate Change Knowledge Portal, to ensure transparency, replicability, and transnational applicability. Beyond its technical dimension, the paper also addresses the broader economic and security implications of smart disaster management, arguing that digitalized risk governance must be understood as part of a wider resilience ecosystem shaped by geopolitical fragility, cyber vulnerability, and digital dependency. The findings suggest that disaster management should no longer be treated as a narrow field of civil protection, but as a strategic component of national resilience in an era defined by compound and systemic risks.*

Keywords: *Disaster Management, Artificial Intelligence, Critical Infrastructure, Urban Resilience, Decision Support Systems*

Cybersecurity, Threat Detection and Critical Digital Infrastructures

THE HUMAN FIREWALL: HOW KNOWLEDGE OF SECURITY THREATS AND INFORMATION SECURITY CULTURE AFFECTS CYBERSECURITY BEHAVIOR

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Daniel **MICAN**, *Babes-Bolyai University*
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Abstract: *In an era defined by continuous digital integration, the focus of information security has pivoted from software patches to human psychology. While technical defenses remain vital, the individual user represents both the primary vulnerability and the most significant asset for organizational resilience. This research introduces a Knowledge-Attitude-Behavior framework to map the cognitive and contextual pathways that lead to secure digital habits. Specifically, the study examines how an individual's understanding of risks and their company's internal security environment triggers the emotional and motivational shifts necessary for behavioral change. To evaluate the com-plex causal relationships between variables, the study will employ Partial Least Squares Structural Equation Modeling, allowing for a nuanced analysis of how internal states mediate the relationship between knowledge and action. The goal is to provide empirical evidence on how workplace culture and personal expertise unite to transform passive users into active defenders. The findings aim to offer security leaders a strategic framework for developing interventions that move beyond rote information dissemination. By focusing on cultivating collective efficacy and emotional engagement, organizations can build a more robust and sustainable human firewall.*

Keywords: *Cybersecurity Behavior, Knowledge of Security Threats, Fear of Cyberattacks, Protection Motivation, Organizational Security*

A MULTI-LAYER ADAPTIVE THREAT DETECTION ARCHITECTURE FOR WINDOWS COMBINING STATIC ANALYSIS, BEHAVIOURAL MONITORING, AND MACHINE LEARNING

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Abstract: *Modern malware increasingly employs various techniques such as polymorphic code and fileless execution to evade traditional signature-based detection. This paper proposes a modular, multi-layer architecture for an adaptive threat detection system on Windows that unifies static file analysis, kernel-mode behavioural monitoring, user-mode API interception, and machine learning classification into a single coordinated pipeline. The architecture follows a hub-and-spoke model in which a central scanning engine correlates event streams from a kernel driver that registers system-wide callbacks for process, thread, image load, registry, object handle, network events, and from a user-mode hooking library injected into monitored processes via the Microsoft Detours framework. A dedicated static analysis module extracts structural metadata from thirteen file formats, producing feature vectors that, when combined with behavioural event sequences, are classified by machine learning models. The inter-process communication design employs Filter Communication Ports for the kernel-to-user and user-to-kernel boundaries and Named Pipes for cross-process user-mode channels, each hardened with various security mechanisms that mitigate the need for vendor-specific mechanisms such as Protected Process Light.*

Keywords: *Windows, Malware Analysis, Artificial Intelligence, Adaptive Detection*

SECURE AI EMBEDDED LINUX KERNEL MODULE WITH PQC ALGORITHMS FOR INTRUSION DETECTION/PREVENTION SYSTEM IN IOT

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Mihai **DOINEA**, *Bucharest University of Economic Studies*
Cristian **TOMA**, *Bucharest University of Economic Studies*
Marius **POPA** *Bucharest University of Economic Studies*
Andrei **CAZACU**, *Bucharest University of Economic Studies*

Abstract: *A Linux Kernel Module (LKM)–based IDS places security monitoring and optionally enforcement logic inside the kernel. This gives high-fidelity visibility into system events (syscalls, process behaviour, network traffic, file operations) and can detect tampering that user-space agents might miss. Adding Post-Quantum Cryptography (PQC) strengthens the module's authentication, integrity, and update trust against future quantum-capable adversaries—primarily by replacing or augmenting classical signatures/key exchange with quantum-resistant options. The AI module is using Artificial Neural Network (ANN) for processing events windows in order to classify and flag potential malicious attacks.*

Keywords: *Linux Kernel Module, Intrusion Detection System, Cybersecurity, Post Quantum Cryptography, Internet of Things*

GREENNIDS: A BENCHMARK WORKFLOW AND ANALYSIS DATASET FOR NETFLOW INTRUSION DETECTION EXPERIMENTS

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Abstract: *Flow-based Network Intrusion Detection Systems (NIDS) studies are still often presented as score tables, although a benchmark run produces a much richer experimental record than a final classification metric alone. GreenNIDS is a benchmark workflow for public NetFlow dataset families that executes heterogeneous model runs, stores a common artifact set for each run, and ingests those outputs into a versioned family of analysis tables. The main run-level table brings together predictive performance, training and inference timing, throughput, memory use, TDP-based energy estimates, and provenance fields, while companion tables preserve feature importance, training history, model configuration, and raw artifact references. This structure turns a collection of benchmark folders into an analysis dataset that can be queried in different ways after the runs have already been completed. Grouped summaries, trade-off plots, coverage audits, and additional analysis elements such as budget screens or feasibility queries can be added on top of the same stored records without changing the experiment execution workflow. The reported benchmark test set of 216 runs spans multiple NetFlow families, dataset versions, tasks, and frameworks, and shows how analysis choices made after ingestion—such as time budgets, RAM ceilings, energy screens, and performance cutoffs—shape the analytical questions that can be asked of the same underlying runs.*

Keywords: *NIDS, NetFlow, benchmark, Green AI, reproducibility, Machine Learning, Cybersecurity*

IMPLEMENTATION OF A SIEM SYSTEM FOR MONITORING AND ANALYSIS OF CYBER ATTACKS

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Abstract: *As modern web applications represent a popular and frequently targeted type of information system, effective security monitoring requires centralized visibility, structured event processing, and meaningful visualization. This paper presents the design, implementation, and evaluation of a Security Information and Event Management (SIEM) solution for monitoring and analyzing cyber-attacks targeting a vulnerable web application. The evaluation is guided by a set of competency questions addressing detection, correlation, and visualization. The results demonstrate that the implemented SIEM pipeline successfully*

centralizes application-level security events, distinguishes malicious behavior from legitimate activity, and supports temporal correlation of attack patterns. The combined use of exploratory and monitoring-oriented visualizations enhances situational awareness and facilitates informed security analysis. Overall, this work illustrates the practical value of SIEM systems in web application security using open technologies to enable SMEs in achieving enterprise grade security.

Keywords: *SIEM, web application security, cyber-attack detection, log analysis, security monitoring, vulnerability simulation*

A BIBLIOMETRIC ANALYSIS OF AI DRIVEN DECISION SUPPORT SYSTEMS FOR CYBERSECURITY

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Abstract: *This study examines the structural organization of research on artificial intelligence in cybersecurity with a focus on its integration into decision support systems (DSS). Using a bibliometric approach based on Web of Science data, the analysis applies co-word analysis, bibliographic coupling and thematic mapping implemented in R using bibliometrix package and visualized through network-based techniques. The results identify eight thematic clusters, including intrusion detection, deep learning, explainable AI, risk management, decision support systems, governance, cyber threat intelligence and emerging AI technologies. Thematic maps and network analyses indicate that machine learning-based detection systems dominate the field, exhibiting high centrality and density, while decision-support-related themes remain peripheral. Conceptual structure analysis reveals limited linkage between technical detection research and managerial domains such as risk management and governance. The findings demonstrate that the literature is characterized by structural fragmentation across three layers: detection, risk assessment and decision support. While detection models are well developed, the integration of algorithmic outputs into managerial decision-making frameworks remains weak. This study contributes by providing a systematic mapping of the field and identifying gaps that hinder the development of AI-enabled cybersecurity decision support systems.*

Keywords: *Artificial Intelligence, Cybersecurity, Decision Support Systems (DSS), Bibliometric Analysis, Co-word Analysis, Risk Management*

A TAXONOMY OF ATTACKS AND MITIGATIONS IN THE CONTEXT OF CONTINUOUS AUTHENTICATION BASED ON BIOMETRICS AND BEHAVIORS

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Abstract: *This paper aims to identify attack types targeting continuous authentication systems and to evaluate corresponding mitigation strategies. Continuous authentication has gained significant attention in recent years, particularly in fields such as finance and healthcare, where the demand for robust security is high. Through a systematic literature review of over 50 papers from security-related journals, this study addresses the fragmented nature of existing research by proposing unified classifications of attacks and mitigation strategies targeting continuous authentication systems. In doing so, the review proposes a classification of attacks and their operational impact in relation to biometric features, identifies key methods of defense, and provides recommendations for commonly encountered cases. Furthermore, attacks and defense methods are explained and exemplified through relevant studies in the field. Overall, this study contributes to the literature by consolidating existing knowledge on attacks and defense methods under a unified classification, while also incorporating recently emerged attack and defense types. Additionally, it offers a framework for prioritizing defenses based on operational impact and complexity.*

Keywords: *User Behavior, Continuous Authentication, Attacks Classification, Mitigations Classification*

Economic Cybernetics and Data-Driven Modeling

URBAN QUALITY OF LIFE DYNAMICS IN EUROPEAN CITIES BEFORE, DURING, AND AFTER THE PANDEMIC: EVIDENCE FROM FUZZY CLUSTERING

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Stefan **IONESCU**, *Bucharest University of Economic Studies*
Camelia **DELCEA**, *Bucharest University of Economic Studies*

Abstract: *This study investigates the evolution of quality-of-life conditions in 26 European countries using indicators extracted from Numbeo database. The dataset includes measures related to purchasing power, safety, healthcare, cost of living, housing affordability, commuting time, and pollution. To capture structural changes in time, the data are divided into three periods: pre-pandemic (2014–2018), pandemic (2019–2022), and post period (2023–2026). We apply silhouette-based cluster validation and fuzzy c-means clustering to identify groups of cities with similar socio-economic and environmental characteristics. The results reveal two separated clusters before the pandemic, a more fragmented structure with five clusters during the pandemic, and a return to two clusters in the post period. Cities in Northern and Western Europe have higher quality-of-life levels, stronger purchasing power, and lower pollution. Several Southern and Eastern European cities face greater structural challenges. The findings highlight how global shocks such as the COVID-19 pandemic can temporarily increase heterogeneity among urban systems while also reshaping long-term urban development patterns.*

Keywords: *quality of life, environment, fuzzy clustering, pandemic impact, urban sustainability*

A COMPARATIVE ANALYSIS OF CORRELATION AND REGRESSION PATTERNS BETWEEN OIL PRICE AND ECONOMIC WELLNESS OF SELECTED EUROPEAN COUNTRIES

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Ion **BULIGIU**, *University of Craiova*

Abstract: *We present a comparative analysis of the influence of Brent oil price volatility on GDP per capita and inflation for five European countries (France, Ger-many, Italy, Greece and Romania) over the years 1992-2020, a period spanning four major global economic crises. The research uses nonlinear Fourier-Toda-Yamamoto regression models to quantify the impact of oil market fluctuations on key economic indicators. The results indicate a strong correlation between changes in GDP per capita and oil price volatility, suggesting that oil market shocks produces a strong effect on economic stability, especially during periods of crisis. On the other hand, inflation shows a weaker correlation with the price of oil, being strongest influenced by the increase or decrease of GDP than directly by oil market volatility. The analysis highlights differences in the reaction of developed countries compared to emerging economies to oil price variations, highlighting the complexity and asymmetry of these economic relationships. The conclusions underline the importance of formulating proactive and adaptive economic policies to moderate the impact of oil price fluctuations on the European economy.*

Keywords: *Oil market volatility, GDP per Capita, Inflation, Fourier TY regression*

AUTOMATED IDENTIFICATION OF SYSTEMICALLY IMPORTANT BANKS WITH GRAPH REPRESENTATION LEARNING AND GRAPH CLASSIFICATION

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Shuyang **PENG**, *Chinese Academy of Sciences*
Muyang **LI**, *Chinese Academy of Sciences*
Yong **SHI**, *Chinese Academy of Sciences*

Abstract: *We propose a novel GCN-ML approach for identifying systematically important banks (SIBs). Unlike most existing work rating the importance of each institution in financial system, we argue that this task could be more efficiently addressed by graph representation learning. Three main stages are included in our model: build graphs for each bank by similarity computation, extract graph embeddings by graph convolutional network (GCN) and distinguish SIBs from normal banks by supervised graph classification. Empirical experiments on Chinese listed banks demonstrate the effectiveness of GCN-ML in identifying SIBs with comparative analysis and sensitivity analysis conducted to illustrate its optimal performances.*

Keywords: *Financial automation, Systematically important banks, Graph representation learning, Graph classification*

DIGITALIZATION, TRADE, INNOVATION, AND SUSTAINABILITY ACROSS EUROPEAN COUNTRIES: A MULTIVARIATE EXPLORATORY ANALYSIS

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Virginia **MĂRĂCINE**, *Bucharest University of Economic Studies*
Zahra **HOSEINI**, *University of Helsinki*
Jani **KINNUNEN**, *Åbo Akademi University*

Abstract: *The study analyses the structural differences between seven European countries, Spain, Romania, Italy, the Netherlands, Germany, France and Poland, over the period 2000–2024, based on indicators that capture economic development, digitalization, innovation, trade openness, investment and sustainability. To synthesize the information contained in the dataset and to highlight similar economic profiles, the research uses principal component analysis (PCA), hierarchical cluster analysis and statistical validation tests. The results show that the economies included in the sample do not follow the same evolution pattern: the Netherlands and Germany are distinguished by more pronounced structural advantages, Romania appears as a separate pro-file, and Poland occupies an intermediate position, suggesting a process of convergence towards more developed economies. Overall, the analysis confirms that digitalization, innovation and sustainability manifest themselves at different rates from one country to another, which reflects the persistence of important structural differences within the European space.*

Keywords: *principal component analysis, cluster analysis, digitalization, innovation, sustainability, European economies, structural convergence*

THE SPATIOTEMPORAL EVOLUTION CHARACTERISTICS AND SPATIAL MISALIGNMENT ANALYSIS OF CHINA'S HEALTHCARE RESOURCE ALLOCATION EFFICIENCY

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Abstract: *For years, tertiary hospitals have been overwhelmed with patients while primary care facilities remain underutilized—a phenomenon prevalent across the country, particularly in third-tier cities and underdeveloped regions. Moreover, issues such as uneven distribution and misallocation of medical resources continue to exist nationwide. In some regions, the efficiency of*

healthcare resource allocation remains low. Therefore, the study constructs a SBM super-efficiency model based on healthcare resource input and output indicators from China's 31 provinces between 2014 and 2022. It calculates the efficiency of healthcare resource allocation for each province during this period and derives the Dagum Gini coefficient and Moran's I index based on this efficiency, which enables a more thorough analysis of spatial disparities and spatial correlations in healthcare resource allocation efficiency across China's four major regions. the geographic detector method is employed to select appropriate influencing factors for analysis through these spatial variations, identifying those with significant effects on resource allocation efficiency. Among these, two factors exhibiting the strongest explanatory power and nonlinear synergistic interactions are chosen for spatial misalignment analysis. Finally, it is evident that significant imbalances currently exist between provinces and regions in China. The level of healthcare resource allocation in each province may exceed or fall below the regional development level. To achieve an appropriate level of healthcare resource allocation across provinces and realize the goal of equity, it must be aligned with their economic development levels. Relevant improvement recommendations are provided.

Keywords: *Efficiency of Healthcare Resource Allocation, Dagum Gini Coefficient, Geophysical Detector, Spatial Displacement*

Artificial Intelligence, Machine Learning and Predictive Analytics

EXPLAINABLE MACHINE LEARNING FOR FINANCIAL BEHAVIOR CLUSTERING OF ROMANIAN FIRMS: AN XAI-DRIVEN APPROACH

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Abstract: *This study develops and empirically validates an Explainable Artificial Intelligence (XAI)-driven framework or financial behavior clustering of Romanian firms. Using a structured dataset of 1037 companies covering the period2020–2024, unsupervised learning is applied to standardized indicators reflecting liquidity, leverage, profitability, and operational efficiency. The methodological contribution lies in the integration of a multi-layer validation architecture combining internal clustering quality assessment, inter-method consistency testing, bootstrap-based stability evaluation, and temporal robustness analysis. An explainability layer is incorporated to quantify the contribution of financial variables to cluster differentiation, thereby enhancing interpretability in an unsupervised context. The empirical results reveal three statistically stable and economically coherent financial behavioral regimes primarily structured around liquidity and asset turnover dynamics. By formalizing a transparent and reproducible XAI-based clustering pipeline, the study advances methodological rigor in financial segmentation and contributes to the development of interpretable machine learning applications in business information systems.*

Keywords: *Explainable Artificial Intelligence, Financial clustering, Machine Learning*

AI-DRIVEN DEMAND RESPONSE FOR OVERVOLTAGE PREVENTION I PROSUMER NETWORKS

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Sebastián **MADRIGAL**, *Universitat Autónoma de Barcelona*
Antoni **MORELL**, *Universitat Autónoma de Barcelona*
Ramon **VILANOVA**, *Universitat Autónoma de Barcelona*
Jose **VICARIO**, *Universitat Autónoma de Barcelona*
Adela **BÂRA**, *Bucharest University of Economic Studies*

Abstract: *The widespread adoption of rooftop solar photovoltaic systems in residential low-voltage distribution networks poses persistent overvoltage risks that lead to involuntary solar curtailment, disproportionately affecting grid-edge prosumers. This paper proposes an end-to-end framework for predictive demand response in a 10-prosumer radial energy community, combining linearized DistFlow power-flow simulation with a six-classifier machine-learning benchmark for overvoltage detection. Applied to high-resolution1-minute Pecan Street data aligned with a 2018 ERCOT Four Coincident Peak event, the baseline simulation identified4,608 trip-minutes and 262.13 kWh of curtailed energy, representing a community loss of €78.46 (over 3 days).Among the evaluated classifiers, Gradient Boosting achieved the highest net community gain of €21.47 within a 10-minutepredictive horizon, outperforming the 15-minute alternative across five of six models. Results demonstrate that classifier selection is both a technical and financial decision, and that the proposed framework offers a scalable, economically grounded approach to automated curtailment mitigation in distributed energy communities.*

Keywords: *Solar curtailment, Overvoltage detection, Demand response, Low-Voltage Distribution Network, Machine Learning, Classification*

ASPECT-BASED SENTIMENT ANALYSIS OF ROMANIAN GUESTHOUS REVIEWS: A LEXICON-BASED APPROACH

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Abstract: *This paper presents an interpretable lexicon-based Aspect-Based Sentiment Analysis (ABSA) framework designed for Romanian guesthouse reviews extracted from an online travel platform (travelminit.ro). The proposed system processes semi-structured text data and generates for seven domain specific categories: Room, Cleanliness, Staff, Location, Food, Facilities and Price-Value for Money an overall sentiment and fine-grained aspect-level*

sentiment. The framework incorporates lemma-based normalization using a Romanian natural language processing pipeline, enabling alignment between review text and lexicon items. To capture linguistic phenomena like polarity strength, negation, intensification and attenuation, a weighted sentiment scoring mechanism is computed. Several sentiment computation methods are implemented, like token-level, sentence-level and context-window-based approaches. Experimental results indicate that the weighted sentiment model consistently outperforms baseline approaches, particularly in handling negation and sentiment intensity. Furthermore, the system provides transparent and interpretable outputs through explicit evidence tracking, making it suitable for real-world analytical application.

Keywords: *ABSA, Romanian NLP, Guesthouse Reviews, Lexicon-Based Methods, Lemmatization*

A DECISION FRAMEWORK FOR PARADIGM-AWARE QUANTUM CODE GENERATION IN AUTONOMOUS AGENT SYSTEMS

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Madalina **ZURINI**, *Bucharest University of Economic Studies*
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Abstract: *Cloud platforms such as IBM Quantum have made quantum hardware more accessible for research and experimentation. Meanwhile, autonomous agents powered by Large Language Models (LLMs) are increasingly being used to generate code automatically across various domains. However, when these agents receive a computational problem from a user, they often struggle to decide whether quantum computing offers any real benefits or if the problem is better suited for classical hardware. To address this gap, a decision framework consisting of three stages is proposed. In the first stage, structural features are extracted from the problem description, including the type of problem, the size of the search space, and whether a verification oracle is present. The second stage involves assigning a quantum advantage classification based on current knowledge about NISQ-era algorithms. The third stage verifies whether the resulting circuit can be executed on real hardware, taking into account qubit limits and circuit depth. Circuit generation is implemented for three algorithms: Grover's search, QAOA for combinatorial optimization, and VQE for molecular simulation, tested on the Qiskit Aer simulator with depolarizing and thermal relaxation noise models. The evaluation uses a benchmark of 15 standard and 12 adversarial problem descriptions. An ablation study compares the framework against a standalone LLM (Claude Haiku 4.5) given the same problems but without access to the classification pipeline. The results show that the framework*

achieves 75% accuracy on adversarial inputs, compared to 67% for the bare LLM. What is more interesting is that the two approaches fail on different categories of problems. The LLM tends to be influenced by quantum-related terminology in the description, while the framework misclassifies problems that use non-standard phrasing. The implementation has been validated with 98 automated tests at 96% code coverage and demonstrated through integration with the Agent Zero autonomous agent platform.

Keywords: *Quantum Computing, Decision Framework, Autonomous Agents*

REAL-TIME BROADCAST VIDEO ANALYSIS: A MULTI-MODEL PIPELINE INTEGRATING ZERO-SHOT OCR, TEMPLATE CLASSIFICATION, AND NEURAL NAMED ENTITY RECOGNITION

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Abstract: *Broadcast newsrooms typically rely on manual logging to track guest appearances, a process that is labor intensive and prone to errors during extended live programming. This paper presents a fully automated pipeline for real-time guest name extraction from a live news broadcast video feed, deployed in continuous 24/7 operation on a Romanian news television channel. The system combines deterministic color-gated detection that uses known template geometry with three neural components: an OCR engine for character recognition, a two stage Named Entity Recognition (NER) cascade pairing a Romanian language BERT model with a multilingual transformer fallback for false-positive filtering, and an EfficientNet-B0 classifier for template labeling. Four datasets were constructed to support evaluation: three OCR tiers organized by position in the broadcast signal chain, spanning synthetic renders, controlled HD-SDI video program output captures, and guest appearances captured from the live broadcast feed, plus a manually labeled dataset for classifier training. This tiered methodology enables controlled measurement of how signal-chain degradation affects recognition accuracy. The color gates achieve 100% recall with zero false guest entries end-to-end. A comparative zero-shot evaluation of Tesseract, TrOCR, and Surya shows that Surya attains the lowest character error rate across all tiers, achieving an overall CER of 0.0521 on generated video program output captures and 0.0640 on live broadcast data, confirming generalization to real transmission conditions.*

Keywords: *Transformer OCR, Broadcast Video Analysis, Named Entity Recognition, Template classification, Text Recognition*

MACHINE LEARNING AND MULTI-TASK LEARNING APPROACHES TO PREDICTING COST AND DELAYS IN AGILE IT PROJECTS

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Abstract: *Accurate estimation of cost and schedule deviation remains a central challenge in Agile IT project management, where project outcomes are shaped by interacting technical and organisational factors. This study examines whether classical machine learning and multi-task neural learning can improve the prediction of final project cost and implementation delay using 3,000 structured Agile project records. Three baseline regressors, Random Forest, Linear Regression, and Ridge, were compared with a multi-task learning neural network implemented in PyTorch. The neural architecture employed shared dense layers of 64 and 32 neurons, followed by task-specific branches, and was trained with the Adam optimiser under a joint mean squared error objective. To ensure a valid evaluation, planned cost and duration variables were excluded to prevent data leakage, and all features were standardised using StandardScaler. Results show that Random Forest performed best for cost prediction (MAE ≈ €110,796; R^2 ≈ 0.96), while the linear models produced slightly better delay estimates (MAE ≈ 1.73 weeks). The multi-task model achieved competitive performance on both targets (cost MAE ≈ €115,428; delay MAE ≈ 2.06 weeks), demonstrating the feasibility of joint prediction in Agile project analytics and supporting its use in decision-support applications.*

Keywords: *Agile Project Management, Machine Learning, Multi-Task Learning, Neural Networks Cost and Delay Prediction*

A SECURE SELF-HOSTED FILE BROWSER FOR AUTOMATED IMAGE CLASSIFICATION WITH CONTINUOUS LOCAL TRAINING AND DATA SOVEREIGNTY

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Abstract: *In an environment hyper focused on cloud capabilities which come at an added cost, smaller, localized solutions are generally overlooked, especially in terms of storage solutions and machine learning algorithms that may be used to manage logically the storage contents. Given the advancement of image*

recognition and classification algorithms, alongside data governance risks in the current internet ecosystem, the possibility for a user to self-host their own model and train it continuously offers a higher degree of security and control of personal data. The objective of this paper is to document and test a potential file browser with inbuilt machine learning algorithms for image sorting that allows the user to train their own model and share with others at their discretion.

Keywords: *self-hosted AI, image classification, data privacy*

BENCHMARKING XGBOOST, LSTM, AND CHRONOS FOR ONE-HOUR-AHEAD

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Abstract: *This paper investigates one-hour-ahead total building energy consumption forecasting using data collected from a seven-floor commercial building at one-minute resolution over 16 months. The study compares three categories of forecasting approaches: one machine learning model (XGBoost), and one deep learning model (LSTM) trained on 21 engineered features, followed by a pre-trained time series foundation model (Chronos) in a zero-shot configuration without any specific training. While Chronos showed competitive performance despite receiving only raw univariate consumption series, XGBoost achieved the best results. These findings highlight the potential of pretrained time-series foundation models for short-term building load forecasting, while also confirming the continued strength of feature-based supervised methods.*

Keywords: *building energy forecasting, time-series foundation models, zero-shot forecasting*

NOTES ON AMBIGUITY CLASSIFICATION OF POLITICAL CONTENT USING DIFFERENTIAL SHAPLEY FEATURE SELECTION

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Abstract: *Classifying ambiguity in political discourse is a challenging task due to the inherently vague, context-dependent, and strategically crafted nature of political language. This paper introduces DeltaSHAP+, a game-theoretic framework for classifying political statements into three clarity categories—Clear Reply, Clear Non-Reply, and Ambivalent—by leveraging Shapley value–based feature*

selection. The proposed approach combines TF-IDF feature extraction, SMOTE-based class balancing, and a one-vs-all classification strategy using CatBoost, followed by a metaclassification stage that aggregates class-specific predictions. A key contribution of this work lies in the use of Shapley values to identify label specific features, enabling both improved interpretability and more discriminative feature spaces.

Keywords: *Shapley Value, Ambiguity, Feature selection, Classification, Natural Language Processing, TF-IDF, SMOTE*

THE INFLUENCE OF TECHNOLOGICAL INNOVATION, GEOPOLITICAL RISK, AND UNCERTAINTY ON FINANCIAL MARKET PERFORMANCE IN THE SEMICONDUCTOR INDUSTRY

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Abstract: *This study analyzes the evolution of the semiconductor market, focusing on Taiwan Semiconductor Manufacturing Company (TSMC), NVIDIA (NVDA), Advanced Micro Devices (AMD), and the Philadelphia Semiconductor Index (SOX). The analyzed period captures multiple economic regimes, including high-impact phenomena and factors. An integrated econometric and deep learning (DL) framework is employed. Market regimes are characterized using log returns, volatility, cumulative returns, and maximum drawdown, while interdependencies are examined through correlation, regression, and lead-lag analysis. Results indicate a strong influence of NVIDIA on TSMC, highlighting the link between chip design demand and manufacturing capacity. TSMC significantly impacts the SOX index, confirming its central role within the industry. AMD and NVIDIA exhibit high short-term correlation and similar volatility patterns, but lack long-term cointegration, suggesting company-specific divergence.*

Keywords: *Semiconductor Market, TSMC, NVDA, AMD, SOX Index, Volatility, Market regims, Deep Learning, Financial Markets, Geopolitical Risk*

ABOUT CODEBERT GENERALIZATION POWER FOR DETECTING AI-GENERATED CODE ACROSS UNSEEN LANGUAGES AND DOMAINS

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Abstract: *This paper investigates the effectiveness of the CodeBERT model in distinguishing between human-written and AI-generated code, specifically focusing on its ability to generalize across unseen program- ming languages and application domains. Using the SemEval-2026 Task 13 benchmark, the study explores various training strategies, including data augmentation, adversarial training with a Gradient Reversal Layer, and the integration of authentic human code from the CodeParrot cor- pus. While CodeBERT achieves near-perfect performance when test data matches the training distribution, it faces significant challenges under distribution shift. Although various techniques for improving the learning phase were tested, a persistent bias remains, where the model frequently misclassifies unfamiliar human-written code as machine-generated. These findings highlight the critical need for greater training data diversity and more robust feature representations to detect synthetic code reliably in real-world environments.*

Keywords: *AI-generated code detection, CodeBERT, Transformer models, source code analysis*

COORDINATING MLOPS RETRAINING ACROSS AI FRAUD DETECTION MICROSERVICES: A SAGA-BASED APPROACH

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Abstract: *When machine learning models are deployed as independent microservices, they can be updated and scaled without touching the rest of the system. But this flexibility comes with a hidden cost: if one model starts degrading due to concept drift, when real-world data shifts away from what the model was trained on, other models that depend on it may need to be retrained too, in the right order, without breaking the system in the meantime. Neither microservices resilience patterns nor MLOps frameworks were designed to handle this. Resilience patterns deal with servers going down, not models quietly becoming wrong. MLOps pipelines retrain models in isolation, not as part of a*

coordinated distributed workflow. We propose the Retraining Saga, a coordination pattern that borrows from the well-known distributed Saga pattern and applies it to ML model lifecycle events. It defines how drift detection should trigger retraining across dependent services, how partial failures should be rolled back, and what contracts services must ex-change along the way. We ground the pattern in a real-time fraud detection architecture and discuss when to use a decentralized event-driven approach versus a centralized coordinator.

Keywords: *Saga pattern, Concept drift, AI fraud detection, MLOps, Distributed ML coordination, Microservices resilience patterns*

LDA-BASED TOPIC MODELING FOR PERSONALIZED SEQUENTIAL LEARNING PATH RECOMMENDATIONS IN MOOC

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Abstract: *Massive Open Online Courses (MOOCs) generate large volumes of course metadata, including textual descriptions that remain underutilized in recommendation systems. This paper investigates how Latent Dirichlet Allocation (LDA)-based topic modeling of MOOC course descriptions can enhance the personalization of sequential learning path recommendations. We compare LDA-enhanced models against traditional collaborative filtering and content-based baselines. Results suggest that topic-aware representations improve both recommendation relevance and sequence coherence, particularly for cold-start users and sparsely rated courses.*

Keywords: *MOOC recommendation, Latent Dirichlet Allocation, Learning path*

BRIDGING AI READINESS AND HUMAN DEVELOPMENT: THE ROLE OF ECONOMIC PERFORMANCE AND INNOVATION INVESTMENT

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Abstract: *As governments worldwide prepare for the AI era, understanding how economic capacity and innovation investment shape human development is critical. This study analyzes 193 countries over 2019–2023 to explore the links*

between the Human Development Index (HDI), GDP per capita, research and development (R&D) expenditure, and the Government AI Readiness Index (GAI), while controlling for macro-socioeconomic factors such as inflation, employment, population, welfare spending, institutional quality, and inequality. We employ quantile regressions (τ = 0.25, 0.50, 0.75, 0.90) to capture heterogeneous effects and complement these with income group analyses and interaction terms between GAI and income dummies. To uncover structural patterns among countries, K-means clustering is applied to standardized variables, with cluster selection guided by the Silhouette score and results interpreted through PCA, ANOVA/Kruskal–Wallis, and χ^2 tests. Our findings reveal a robust positive association between HDI and GDP per capita, while R&D and AI readiness effects vary contextually: GAI contributes most to human development in high-HDI, high-income countries, highlighting institutional and absorptive capacity constraints in lower-income contexts. This study offers novel insights into the intersection of AI readiness, economic resources, and human development, providing evidence-based guidance for policymakers aiming to maximize the societal benefits of AI.

Keywords: *Artificial Intelligence, Human Development, Economic Performance, R&D, Government AI Readiness*

CLASSICAL VS. MACHINE LEARNING FORECASTING FOR BLOCKCHAIN CARBON ASSETS: A COMPARATIVE STUDY OF BCT AND NCT

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Abstract: *This study evaluates the forecastability of tokenized carbon credits by comparing classical econometric and machine learning models on two blockchain-native carbon instruments: Base Carbon Tonne (BCT) and Nature Carbon Tonne (NCT), issued by Toucan Protocol on Polygon. Using 1,382 daily observations and a rigorous evaluation framework that combines false discovery rate corrected feature selection, cointegration analysis, Diebold-Mariano testing, and expanding-window validation, the results show that forecastability depends entirely on the specific token and the availability of exogenous information. BCT exhibits random-walk behaviour, with no exploitable predictors after multiple testing correction. In contrast, NCT becomes highly forecastable when a single cross-asset variable, the BCT-NCT price spread, is included, reducing forecasting error by 87% and achieving over 82% directional accuracy. The spread is confirmed as stationary through cointegration testing, providing formal econometric justification for its predictive role. A second key finding concerns machine learning deployment. Rolling-retrained XGBoost*

closes over 93% of the gap between batch-trained models and classical benchmarks, indicating that the widely reported failure of machine learning in non-stationary markets is primarily a retraining problem rather than an architectural limitation. EGARCH volatility analysis further shows that both tokens operate near the mathematical boundary of infinite variance, challenging standard risk metrics. Collectively, these findings demonstrate that deliberate ecological pool design, specifically restricting eligible credits to nature-based projects, creates financially distinct instruments with exploitable cross-asset dynamics that are absent in unrestricted pools.

Keywords: *Tokenized Carbon Credits, Time Series Forecasting, Regenerative Finance*

Generative AI, Large Language Models and Organizational Transformation

ARTIFICIAL INTELLIGENCE AND LARGE LANGUAGE MODELS AS A COGNITIVE LAYER IN INNOVATION ECOSYSTEM MANAGEMENT

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Margarita **BOGDANOVA**, *Tsenov Academy of Economics*
Evelina **PARASHKEVOVA-VELIKOVA**, *Tsenov Academy of Economics*
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Abstract: *The purpose of the study is exploring the role of Artificial Intelligence (AI) and Large Language Models(LLMs) as a cognitive layer in managing innovation ecosystems. Moving from static linear models to dynamic networks, the research defines AI not merely as an automation tool but as a system capable of real-time interpretation and reasoning. The authors propose a three-tier architecture – Perception, Cognition, and Action– supported by the GRAI (Generative Receptive AI)framework, which evolves traditional knowledge management(SECI) into deep human-machine collaboration. The analysis highlights how AI transforms core management functions (POLC), shifting focus toward strategic decision-making through innovation scouting and predictive analytics. A case study of the KreativEU university alliance demonstrates practical applications, including curriculum mapping, architectural modeling, and collective memory enhancement. The research suggests that organizational success in the AI era relies on a symbiotic relationship where human intuition complements machine-driven complexity to foster continuous ecosystem co-evolution.*

Keywords: *AI, LLM, Cognitive Layer, Innovation Ecosystem, Generative Receptive AI*

BEYOND ACCURACY: A CREDIBILITY ASSESSMENT FRAMEWORK FOR LARGE LANGUAGE MODELS IN ENTERPRISE BUSINESS INTELLIGENCE

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Abstract: *The rapid adoption of large language models (LLMs) in enterprise business intelligence raises critical questions about the credibility of their outputs. While organizations increasingly rely on tools such as Claude, GPT, and Gemini to generate market analyses, financial summaries, risk assessments, and regulatory briefs, no established framework exists for systematically evaluating how credible these outputs are across multiple dimensions. This paper addresses this gap by proposing the CAF-LLM (Credibility Assessment Framework for LLMs), a six-dimensional rubric grounded in information credibility theory and designed specifically for LLM-generated business intelligence content. The six dimensions are: Factual Accuracy, Output Consistency, Source Traceability, Reasoning Transparency, Bias and Fairness, and Contextual Relevance, each operationalized through automated heuristic scoring applicable without human involvement. It is important to note that this automated scoring constitutes a reproducible, scalable pre-scoring layer: dimension scores are surface-level proxies derived from textual signals rather than semantically or knowledge-grounded measurements and are designed to be complemented by expert review in high-stakes deployment contexts. We validate the framework through a comparative case study in which 108 responses to twelve enterprise BI prompts, spanning Market Analysis, Financial Summary, SWOT Analysis, Risk Assessment, Regulatory Brief, and Strategic Recommendation, are collected from Claude Sonnet 4.6, GPT-5.4, and Gemini 3.1Pro, and scored using the CAF-LLM pipeline. Results indicate that Claude Sonnet 4.6 achieves the highest aggregate credibility score (3.85/5.00), with particular strength in Source Traceability (4.56) and Reasoning Transparency (4.91). Output Consistency emerges as the weakest dimension across all three models, confirming that high-temperature sampling introduces material run-to-run variability that poses a reliability risk for decision-support applications. The paper contributes a structured, replicable instrument for LLM credibility assessment in enterprise contexts, with implications for AI governance, model selection, and responsible deployment in regulated business intelligence workflows.*

Keywords: *Large Language Models, Business Intelligence, Credibility Assessment*

ALGORITHMIC DIPLOMACY AS AN EVOLVING PARADIGM OF CYBER DIPLOMACY: A STUDY OF THE LITERATURE ON ALGORITHMIC DIPLOMACY

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Abstract: *The rapid incorporation of algorithms, artificial intelligence (AI) and automation in diplomatic, security, and economic governance processes is transforming contemporary diplomatic practices. This paper conceptualizes*

"algorithmic diplomacy" as a developing paradigm of cyber diplomacy which highlights how algorithmic systems increasingly influence the mediation of perception, decision making and power relationships in international affairs. Using both bibliometric analysis and conceptual inquiry, this study maps the existing academic literature on algorithmic diplomacy through a review of articles in the OpenAlex database. The results indicate there has been a considerable amount of asymmetry; despite the fact that the explicit phrase "algorithmic diplomacy" appears infrequently in academic literature, there exists a large and rapidly growing body of work examining similar dynamics under other terms such as AI diplomacy, digital diplomacy and information security governance. This lack of cohesion among scholars suggests a continued disconnect between the extensive use of algorithmic systems in diplomatic practice and the theoretical development of these concepts within the field of international relations.

Keywords: *Algorithmic Diplomacy, Business Informatics, Artificial Intelligence, Cyber Diplomacy, Digital Governance, Information Security*

A PROMPT-ORIENTED FRAMEWORK FOR ASSESSING SECURITY VULNERABILITIES IN LLM-GENERATED CODE

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Gabriela **MEȘNIȚĂ**, *Alexandru Ioan Cuza University of Iasi*

Abstract: *The introduction of Large Language Models (LLMs) into the software development process can lead to the generation of code with security vulnerabilities. This is a pressing issue because LLMs are increasingly being used in real-world applications. In this context, prompt engineering can play a key role, as it can influence the quality and security of the generated code. To analyze this problem, this study proposes a framework that includes the selection of vulnerabilities based on the Common Weakness Enumeration (CWE), the choice of two LLMs (ChatGPT and Claude Sonnet), the selection of SAST tools (CodeQL and Bandit) for code analysis, and the use of the Py-thon language for code generation. The result of the study is a framework for evaluating the security of code generated by LLMs based on 7 selected CWE vulnerabilities, ensuring the reproducibility of future research. This framework can serve as the basis for experimental studies analyzing the impact of different prompting techniques on vulnerabilities introduced by LLMs.*

Keywords: *Large Language Models (LLMs), code security, vulnerability detection, prompt engineering, static application security testing (SAST)*

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON DECISION-MAKING PROCESSES IN ORGANIZATIONS: COGNITIVE BIAS VS. ALGORITHMIC BIAS

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Abstract: *Organizational decision-making has traditionally been associated with human reasoning and with managers' ability to interpret available information in contexts characterized by uncertainty and multiple constraints. The growing adoption of artificial intelligence for decision support has altered this framework by introducing algorithmic mechanisms capable of processing large volumes of data and providing recommendations in near-real-time. In this context, this paper examines the relationship between cognitive bias and algorithmic bias, with the aim of clarifying how these forms of distortion manifest and interact within decision-making processes assisted by artificial intelligence-based systems. The research approach is grounded in a conceptual-analytical review of the literature in behavioral eco-nomics, decision theory, and decision support systems. The results suggest that the use of algorithmic technologies does not, by itself, eliminate decision bias, since the interpretation of information remains shaped by cognitive mechanisms and affective evaluations, while algorithmic models may replicate historical patterns or reflect assumptions and optimization criteria embedded in the design process. Within hybrid decision-making processes, bias effects may be transferred or accumulated, with implications for decision accountability, transparency, and the dynamics of organizational learning. Consequently, this paper highlights the need for an integrated approach to artificial intelligence-assisted decision-making and outlines future research directions oriented toward empirical validation, explainability, and the analysis of medium and long-term effects in organizational contexts.*

Keywords: *Artificial Intelligence, Organizational Decision-Making Process, Cognitive Bias, Algorithmic Bias, Management Information Systems, Decision Support Systems*

AI-DRIVEN ACADEMIC ASSESSMENT APPLICATION

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Abstract: *This paper explores the intersection of Artificial Intelligence Engineering and e-learning systems, proposing an innovative software architecture capable of integrating Large Language Models (LLMs) to reinvent academic assessment.*

Given the infrastructural limitations of contemporary university environments, the paper argues for a mobile-first approach, natively developed in Android and supported by a Firebase cloud infrastructure. The proposed system radically optimizes educators' time through the algorithmic generation of problems directly from course materials and the introduction of dynamic variables alongside automatic rephrasing, ensuring the cryptographic uniqueness of each test. The central innovation lies in an AI-based dual grading mechanism that validates deductive reasoning by evaluating "cascade errors," awarding partial points for logic independent of previous calculation mistakes. Furthermore, the paper details an impenetrable anti-cheat security system specific to mobile applications, demonstrating how this architecture transforms assessment from a rigid administrative process into a deeply personalized learning ecosystem centered on instant formative feedback.

Keywords: *AI Engineering, Dynamic Variables, Logic Evaluation, Formative Feedback, Mobile-First Security, Cloud Computing*

AUDITING DEMOGRAPHIC BIAS IN LLM-BASED ESSAY SCORING

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Abstract: *A scalable alternative to human grading for students' essays is offered by large language models (LLMs) through automated essay scoring (AES). This approach raises questions about fairness regarding student belonging to different demographic groups, as we investigate how essays' scores change when the LLM-based AES system have access to student's demographic information. We are using the ASAP2 dataset, containing approximately 24,700 student essays with human-assigned scores and demographic data, from which we extracted a sample of 564 records. The methodology uses the human scores as a baseline and evaluates the output generated by LLM in two scenarios: firstly, without demographic context, and secondly, by injecting both separately and jointly gender, ethnicity and socioeconomic status in the prompt. Score differences between blind and primed conditions are analysed as causal estimates of the priming effect through paired tests, effect sizes and directional breakdowns. Our findings reveal that human raters exhibit statistically significant disparities along racial and socioeconomic lines. The LLM mirrors this hierarchy during blind scoring, inflating scores across all groups without closing demographic gaps. When demographic attributes are disclosed, only race/ethnicity priming produces a statistically significant shift (mean $\Delta = +0.083$, $p = 1.15 \times 10^{-10}$), with minority students receiving exclusively upward adjustments, while White students remain nearly un-changed ($\Delta = +0.014$). Gender ($p = 0.127$) and socioeconomic priming ($p = 0.447$) show no significant effects. These results indicate that disclosing demographics to an LLM scorer*

substitutes one form of bias for another, with direct implications for equitable AES deployment.

Keywords: *Automated Essay Scoring, Large Language Models, Algorithmic Bias, Demographic Fairness, Demographic Priming*

CIRCULAR ECONOMY ALIGNED GREEN AI ARCHITECTURES FEASIBILITY AND REAL-WORLD BENEFITS

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Abstract: *The accelerating growth of artificial intelligence (AI) is reshaping global digital infrastructure while simultaneously intensifying pressures on energy systems and environmental sustainability. As AI models become more computationally demanding and increasingly integrated into critical sectors, their supporting data centers face rising energy use, resource consumption, and material impacts that extend beyond operational electricity demand. Traditional Green AI efforts have focused largely on improving computational efficiency, yet such approaches address only part of the broader ecological footprint. Emerging research highlights the potential of applying circular-economy principles to AI system design, enabling more sustainable outcomes not only through reduced computational overhead but also through improved material reuse, enhanced resource-recovery processes, and system-level optimization across physical workflows. Multi-layer Green AI architectures - combining energy-aware computation, resource-optimization mechanisms, and intelligent decision-support models - demonstrate the capacity to support regenerative industrial practices, reduce waste, and enable more resilient and efficient infrastructure. These architectures are particularly relevant as AI-driven data centers become more resource intensive and face increasing scrutiny regarding environmental and societal impacts. This article synthesizes current findings and real-world applications to examine how circular-economy-oriented Green AI frameworks can support sustainable digital ecosystems, reduce environmental burdens, and align AI development with long-term climate and resource-efficiency goals. This paper presents a structured review and analytical synthesis of recent research on Green AI architectures, with a specific focus on their alignment with circular-economy principles. Rather than proposing a new algorithmic model, the study critically examines how multi-layer Green AI architectures spanning energy-aware computation, resource-optimization mechanisms, and decision-support systems can contribute to sustainable and regenerative digital ecosystems.*

Keywords: *Green AI, Circular Economy, Resource Optimization, Data Center Sustainability*

ARTIFICIAL INTELLIGENCE: THEORETICAL FOUNDATIONS AND ECONOMIC APPLICATIONS IN THE CONTEXT OF GLOBAL DIGITAL TRANSFORMATION

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Abstract: *This paper analyzes the role of artificial intelligence in the transformation of the contemporary economy, with a focus on its integration into production processes, decision-making, and innovation dynamics. The study highlights that artificial intelligence is no longer merely a technological tool, but a systemic factor that redefines economic structures and the competitive advantages of states. The motivation of this research derives from the rapid pace and increasing complexity of artificial intelligence development, which exceed the adaptive capacity of traditional economic models. In this context, the paper proposes an integrated approach to artificial intelligence as both a production factor and a mechanism for economic optimization. The analysis emphasizes the impact of artificial intelligence on productivity, the digital economy, international trade, and investment, demonstrating that it generates both significant opportunities and structural risks.*

Keywords: *artificial intelligence, economic growth, digital economy, productivity, investment, machine learning, economic modeling*

ASSESSING PERCEIVED ADAPTABILITY OF AI-BASED EDUCATIONAL SYSTEMS: A STUDENT-CENTERED EMPIRICAL STUDY

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Abstract: *The integration of artificial intelligence (AI) in education is reshaping learning, moving from standardized instruction towards personalized and adaptive experiences. This exploratory study investigates the perceived adaptability of AI-based educational systems, comparing the perspectives of students from two distinct fields of study: Economic Informatics and Law. Data were collected through a structured questionnaire designed to measure students' perceptions of adaptive AI functionalities. The study differentiates between traditional AI (static and limited to existing data) and adaptive AI, capable of dynamically adjusting content, feedback and learning pathways based on individual learner needs. By defining key dimensions of adaptability (content*

adaptation, feedback personalization, learning gap identification and pathway adjustment) this research provides an empirical evaluation grounded in students' perceptions. Findings reveal significant differences between groups, highlighting the influence of prior AI experience and disciplinary background on adaptability perception. The discussion emphasises perceived barriers, theoretical and practical implications, and the need for transparent, student-centered adaptive mechanisms. This study advances the field by underscoring the importance of the perceptual dimension and informing the design of AI educational systems that are both effective and impactful for learning outcomes.

Keywords: *Artificial Intelligence, Education, AI vs Adaptive AI, Adaptive Learning, Perceptions*

AI-POWERED MOBILE APPLICATIONS FOR SMART URBAN MO-BILITY IN SUSTAINABLE CITIES: A PRIVACY-AWARE AND DATA-DRIVEN APPROACH

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Abstract: *The global use of mobile technologies and the evolution of artificial intelligence have caused a profound evolution of urban mobility systems. Thus, mobile applications based on artificial intelligence play an important role in planning traffic routes in real time and managing public transport in an efficient way. We have numerous benefits, such as reducing carbon emissions, reducing congestion and improving the overall quality of life. What underlies the efficiency of these systems is the quality of the data collected and the continuous processing of very large volumes of data that are generated by the users themselves. Here we refer to location, mobility preferences or behavioral patterns. Data collection, on the other hand, raises numerous questions about privacy, data use and security. This paper presents a conceptual framework for applications that are based on artificial intelligence in smart urban mobility and that integrate machine learning techniques with data privacy mechanisms, for example, differential privacy and edge computing. This research assesses the impact on the economic and social environment of these applications but also addresses key challenges related to interoperability, stability and compliance with current regulations. The conclusions of this article highlight the importance of designing mobility solutions that must be user-centric but that are sustainable and secure, thus contributing to the development of smart cities for the next generations.*

Keywords: *Artificial Intelligence, Smart Mobility, Mobile Applications*

GENERATIVE AI AND BUSINESS PROCESS MANAGEMENT: A CONCEPTUAL FRAMEWORK FOR AUGMENTING THE PROCESS LIFECYCLE

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Abstract: *Generative artificial intelligence, particularly large language models (LLMs), is visibly influencing research and practice in Business Process Management (BPM), especially in activities involving unstructured data, assisted modelling, and conversational interaction. Considering the benefits and risks associated with applying the LLM in BPM, this paper proposes a conceptual framework for the use of LLMs throughout the process lifecycle, from identification and discovery to monitoring. The central argument is that the value of these technologies lies not in replacing established BPM methods, but in their capacity to transform documents, conversations, and other unstructured sources into operational knowledge useful for modelling, interpretation, and decision-making. The paper delineates opportunities for using LLMs at each stage of the BPM lifecycle, discusses associated risks including hallucinations, decision opacity, and auditability challenges, and formulates principles for responsible adoption.*

Keywords: *Generative AI, Business Process Management, LLM, process lifecycle, process mining, BPMN, governance, digital transformation*

AI-ASSISTED AUTOMATION OF STUDENT PRACTICE PLACEMENT ALLOCATION UNDER LEGISLATIVE CONSTRAINTS

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Abstract: *Recent amendments to Romania's Higher Education Law no. 199/2023 require universities to secure at least 75% of mandatory practice placements for their students, with a minimum of 50% sourced from external partner organizations by the academic year 2029-2030. Meeting this obligation at scale demands a level of administrative coordination that current manual workflows, built around email chains and PDF conventions, cannot realistically support. This paper focuses on the most labor-intensive part of the practice process: identifying eligible partner organizations, matching them to student cohorts by domain or specialty, and automatically generating the required documentation. This paper proposes an agentic AI automation flow in which large language model (LLM) agents handle partner screening, student-partner matching, and*

convention drafting, while the coordinators retain oversight at legally mandated checkpoints. Using a Design Science Research approach, we map the current workflow, derive system requirements from the legislative framework, and present a proof-of-concept built with no-code agentic tooling. The 2026–2029 transition window gives Romanian HEIs a concrete opportunity to refine this process before the compliance deadline, with the present chapter offering a practical and ethically grounded starting point.

Keywords: *higher education, mandatory student practice, Bologna Process, workflow automation, design science research, convention matching, ethical AI, large language models, agentic AI*

LEVERAGING LARGE LANGUAGE MODELS FOR ENHANCED E-LEARNING ARCHITECTURES IN CHESS: A COMPARATIVE ANALYSIS AND IMPLEMENTATION FRAMEWORK

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Abstract: *Traditional chess e-learning platforms deliver content uniformly, ignoring indi-vidual skill levels. This approach can be considered limited in chess education, where learners face diverse conceptual challenges. Large Language Models (LLMs) present a potential solution by functioning as adaptive tutors that provide personalized explanations in natural language. However, their actual effectiveness in this educational role remains unexplored. This study examines seven state-of-the-art LLMs (Claude Opus 4.6, GPT-5.4, Gemini 3.1 Pro, DeepSeek V3.2, Kimi K2.5, Qwen 3.5, and Llama 4 Maverick) to assess their capability as chess instructors. We developed a benchmark of 20 tactical puzzles ranging across five distinct categories. To prevent data contamination, we sourced positions from recent games and applied strategic modifications. Our study focused on assessing the models' ability to provide factually correct explanations. For this purpose, we introduced a scoring framework based on a custom penalty matrix to isolate and penalize distinct hallucination types. The evaluation exposed pedagogical flaws across all selected models, with scores ranging from 79.48 (Gemini) down to a critically low 2.17 (DeepSeek). While the top-performing models demonstrated strong spatial awareness, they frequently succumbed to an "illusion of reasoning" by confidently misidentifying tactical motifs and providing unsound justifications. Conversely, lower-performing models exhibited profound structural blindness, hallucinating piece placements and relationships, as well as proposing illegal moves. Ultimately,*

our findings expose a critical paradox: while LLMs possess the linguistic fluency to deliver human-like commentary, their explanations frequently conceal severe factual errors. We conclude that effective chess e-learning applications require combining the generative capabilities of LLMs with deterministic rule-based systems to ensure accuracy.

Keywords: *Large Language Models (LLMs), Intelligent Tutoring Systems, Chess E-Learning.*

ADDRESSING DISRUPTIONS CAUSED BY ARTIFICIAL INTELLIGENCE IN THE LABOR MARKET

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Abstract: *Although most discussions about the profound impact of artificial intelligence (AI) on the labor market are speculative, often driven by tech giants promoting their own products, we cannot ignore the fact that AI is already beginning to reshape work in its various forms. Today, exposure to new technologies does not necessarily mean job losses, but rather a redistribution of tasks aimed at increasing workplace productivity. However, when these changes occur rapidly, the immediate effect is often mass layoffs and serious social disruptions. Even if this follows a common pattern, the transition we are experiencing today is likely to be far more abrupt since ChatGPT reached one million users within five days of its launch and 100 million within the first two months, making it almost impossible for the labor market to gradually adapt to these transformations as it has in the past. Moreover, AI is no longer limited to routine tasks, it is increasingly performing cognitive functions today. This means that, unlike previous technologies, it does not only automate repetitive tasks but also affects the work of professionals across nearly all sectors of the global economy. This paper highlights the urgent need for government support in developing appropriate policies to manage the impact of AI on unemployment, including support for affected individuals, accelerated reskilling efforts, and legislative reform, while recognizing that protecting citizens from economic turbulence remains one of the fundamental responsibilities of any modern state.*

Keywords: *Artificial Intelligence, Labor Market, Technologies, Automation, Governance*

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