Book of Abstracts

The Fourth Serbian International Conference on Applied Artificial Intelligence (SICAAI)

May 29-30, 2025, Zlatibor, Serbia

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The Fourth Serbian International Conference on Applied Artificial Intelligence, Kragujevac – Book of Abstracts

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Contents

Organizers 4

Sponsors 4

Welcome Message 8

Organizing Committee 11

Technical Program 14

Keynote Speakers 21

- Collaborative Innovation in AI: Partnerships Between Academia, Industry, and Government 22
- Using AI to Discover Conjectures – The Balkans Continued Fraction Example 23
- AI at the Edge of Precision: Accelerating AI Efficiency with Approximate Computing 24
- The Road to General AI in Medicine: The Promise and Challenges 25
- Generative AI for Robust Map Generation from Satellite Imagery 26
- Large Documents Must Allow More than Passive Reading 27
- The Role of AI in Outdating Homo Sapiens 28
- Digital Preservation of Family Heritage Enhanced Using Artificial Intelligence 29
- 3D Computer Vision: Reconstruction, Generation, and Manufacturing 30
- On the Mission of the Cosmos University in Data Science and Artificial Intelligence 31
- The Mission of NanoHUB 32
- Open Platforms for the Embodied AI era 33
- Fundamentally Accelerating Genome Analysis 34
- On the Mission of the University of Wisconsin in the Domain of Entrepreneurship and Discovery 35

Book of Abstracts 36

- Application of Neural Networks in Assessing Body Comfort During Driving 37
- Comparative Analysis of Expert-Based and AI-Driven Methodologies in Children's Traffic Safety Education 38
- Dynamic LSTM-Based Framework for Adaptation to Concept Drift in Energy Consumption Forecasting 39
- A CCGAN-Driven Method for Context-Aware Correction of River Flow Time Series 41
- The Use if AI in Developing Architectural Designs / Expo Pavilion Project 42
- Comparison of CNN Architectures For Earthquake Damage State Classification of Different Building Types 43
- Crop Yield Prediction Using SENTINEL-2 Satellite Imagery and Deep Learning Models 44
- Short Review of Machine Learning Support in the Development of Soft Piezoelectric Materials 45
- Lung Cancer Classification from CT Images Using The Dinov2 Vision Transformer Architecture 46
- Unlocking Cardiographic-Based Biometric Potential: Insights from Feature Selection 47
- Feature Subset Selection for Low Back Pain Prediction: Machine Learning Approach 48
- Human-AI Collaboration in Shaping Modern Survey Design: Opportunities and Challenges 49

Comparison of RFE and SHAP for PRV Feature Ranking in Cognitive Stress Scenario 50
Feature-Based Machine Learning and Deep Neural Networks for Real-Time Stress Classification From GSR and HR Signals 51
The Possibilities and Limitations in Automatic Personality Trait Detection Based on Text Essays Written in Serbian 52
Analysis and Forecasting of Electricity Consumption in the Data Center 53
Enabling Robust Elderly Care Robotics: Task Decomposition and Self-Evaluation Frameworks Enhanced by Large Language Models 54
Tackling Online Harassment Using Natural Language Processing and Metaheuristic Optimization 55
Fuzzy C-Means over Node Embeddings Outperforms Leiden for Overlapping Community Detection in Large-Scale Customer Graphs 56
Fairness Through Synthesis: Bias Mitigation Through Probabilistic Modeling and Matching Techniques 57
Using Agent-Based Models for Generation of Surrogate Model Virtual Populations: Atherosclerosis Case Study 58
Diabetes Melitus and AI - Clinical Practice 59
Machine Learning Based Prediction of a Cell Death after Silver Nanoparticle Treatment 60
Recognizing Patterns of Emerging Chronic Obstructive Pulmonary Disease in Heart Failure Patients Through the Use of Machine Learning Techniques 61
Benefits of Using Genetic Algorithms in Estimation of Parameters of a Numerical Model for Prediction of Cancer Progression 62
Harnessing Artificial Intelligence for the Design of New Potential Inhibitors of The Lipoxygenase 63
Smarter Than Mutation: AI-Based Drug Modifications Against Pharmacological Resistance 64
Leveraging Deep Learning and Word Embedding for Financial Sentiment Analysis with Chatgpt-Based Data Augmentation 65
The Role of Artificial Intelligence in Marketing Strategies: Opportunities and Challenges 66
Algorithmic Dependencies and Regulatory Gaps: Journalism in the Age of AI 67
Will AI Replace Humans in Strategizing Communications? Ethical Considerations 68
The Interplay of Artificial Intelligence and International Public Law: Principle of Non-Intervention 69
Self-Driving Dilemmas: The Collision of Technology and Legal Responsibility 70
International Science Olympiads in Artificial Intelligence: a Passing Trend, or Here to Stay? 72
Economic Evaluation of Heart Failure Strategies in the StratifyHF Project 73
Gamifying Risk Management: a Generative AI-Driven Tetris-Inspired Simulation for Enhanced Decision-Making 74
A Comparison of Six Selected Computing Paradigms 75
A Rapid Review on Artificial Intelligence Algorithms in the Study of Benthic Ecosystems: Applications, Performance and Future Trends 76

Software Architecture for Stratifyhf: Heart Failure Risk Stratification and Diagnosis 77

Heart Failure Disease Progression Assessment in Patients Through the Use of Traditional Machine Learning Approaches 78

Impact of Different Biomarkers on the Prediction Capabilities of Machine Learning Models in the Diagnosis of Heart Failure 79

Prediction of Different Symptoms Emergence in Heart Failure Patients Using Machine Learning Approaches 80

Assessment of Morbidity in Patients with Heart Failure Using Traditional Machine Learning Techniques 81

Risk of Death Assessment in Patients Suffering from Heart Failure Using Regression Analysis Techniques 82

Prediction of Controlled Drug Release From Intraocular Lens Using a Genetic Algorithm 83

Random-Forest Risk Classification in Hypertrophic Cardiomyopathy Patients..... 84

Explainable AI for Continuous Glucose Monitoring Data..... 85

Enhancing Robotic Grasping With Attention Mechanism and Slam-Based in The Dynamic Grasping Scenario 86

Multipurpose Wearable Sensory Device for Heart Failure Diagnosis and Biomarker Measurement 87

Welcome Message

Dear colleagues and students,

On behalf of the Organizing Committee, it is a pleasure to welcome you at the Fourth Serbian International Conference on Applied Artificial Intelligence (AAI2025) which takes place at Zlatibor, Serbia, on May 29th-30th, 2025.

AAI2025 provides an exceptional Serbian and international forum to share the state-of-the-art research knowledge and results on the innovative theories, methodology and applications of artificial intelligence and its sub-domain like deep learning, machine learning in different areas such as medicine, economy, education, law, smart city, government, industry etc. Moreover, the conference aims to provide a platform for researchers and practitioners for both academia and industry to share the information about cutting-edge developments in the field of artificial intelligence.

It also aims to:

- provide early-stage researchers with an inspiring event allowing them to connect to relevant experts in related fields;
- provide an exciting venue for researchers to network and establish national and international collaborations;
- bring together leading experts from all relevant scientific domains to enhance the understanding of Artificial Intelligence;

Topics cover the following:

AI IN DOMAIN-SPECIFIC APPLICATIONS

- AI in Computational Biology, Medicine and Biomedical Applications
- AI in WWW, Communication, Social Networking, Recommender Systems, Games and E-Commerce
- AI in Finance and Risk Management

AI IN DATA ANALYTICS AND BIG DATA

- Visual Analytics for Big Data
- Computational Modeling for Big Data
- Large-scale Recommendation and Social Media Systems
- Cloud/Grid/Stream Data Mining for Big Velocity Data
- Semantic-based Big Data Mining

MACHINE LEARNING AND DATA MINING

- Pre-processing, Dimension Reduction and Feature Selection Computing, Bayesian and Neural Networks
- Learning Graphical Models and Complex Networks
- Active, Cost-Sensitive, Semi-Supervised, Multi-Instance, Multi-Label and Multi-Task Learning

- Transfer/Adaptive, Rational and Structured Learning

AAI2025 will host the following renowned plenary speakers in the area of applied artificial intelligence:

- **Prof. Borko Furht** – Florida Atlantic University, Boca Raton, Florida, USA; **Title:** ***Collaborative Innovation in AI: Partnerships Between Academia, Industry, and Government***
- **Prof. David Naccache** – ENS' Information Security Group, Paris, France; **Title:** ***Using AI to Discover Conjectures – The Balkans Continued Fraction Example***
- **Prof. Freddy Gabbay** – VLSI Research Lab, The Institute of Applied Physics, The Hebrew University of Jerusalem; **Title:** ***AI at the Edge of Precision: Accelerating AI Efficiency with Approximate Computing***
- **Prof. Zoran Bosnić** – University of Ljubljana, Ljubljana, Slovenia; **Title:** ***The Road to General AI in Medicine: The Promise and Challenges***
- **Prof. Naphtali Rishe –** The inaugural Outstanding University Professor, Florida International University, USA; **Title:** ***Generative AI for Robust Map Generation from Satellite Imagery***
- **Prof. Hermann Maurer** – Fakultät für Informatik und Biomedizinisch Technik, Institut für Human-Centered Computing (HCC), Graz University of Technology, Austria; **Title:** ***Large Documents Must Allow More than Passive Reading***
- **Prof. Alexander D. Stajković** – Dean's Professor in Business, University of Wisconsin-Madison, School of Business, USA; **Title:** ***The Role of AI in Outdating Homo Sapiens***
- **Prof. Veljko Milutinović** – Life Fellow of the IEEE, Washington, D.C., USA Member, a Former Trustee and Treasurer, Academia Europaea, London, GBR Founding Member, Serbian National Academy of Engineering, Beograd, SRB Foreign Member, Montenegrin National Academy of Sciences and Arts, Montenegro; **Title:** ***Digital Preservation of Family Heritage Enhanced Using Artificial Intelligence***
- **Prof. Kyoung Mu Lee** – Dept. of ECE, Seoul National University (SNU), Seoul, South Korea; **Title:** ***3D Computer Vision: Reconstruction, Generation, and Manufacturing***
- **Prof. Panos Razis** – University of Cyprus, Nicosia, Cyprus; **Title:** ***On the Mission of the Cosmos University in Data Science and Artificial Intelligence***
- **Prof. Gerhard Klimeck** – Purdue University, West Lafayette, USA; **Title:** ***The Mission of NanoHUB***
- **Prof. Luca Benini** – University of Bologna, Bologna, Italy; **Title:** ***Open Platforms for the Embodied AI era.***
- **Prof. Onut Mutlu –** ETH, Zurich, Switzerland; **Title:** ***Fundamentally Accelerating Genome Analysis***
- **Prof. Jon Eckhardt –** University of Wisconsin, WI, USA; **Title:** ***On the Mission of the University of Wisconsin in the Domain of Entrepreneurship and Discovery***

We have received more than 100 high-quality research papers. As a result of the strict review process and evaluation, the committee selected over 50 papers as extended abstracts.
After the review, full papers from the AAI2025 conference will be published by Springer Verlag in the series "Applied Artificial Intelligence 4: Medicine, Biology, Chemistry, Financial, Games, Engineering".
We must also admit that the conference certainly would not have been so successful without the efforts of many people who were actively engaged in organization of such a major academic event. We express gratitude to the members of the program and scientific review

committee as well as to all the chairs, organizers and committee members for their dedication and support.
On behalf of the Organizing Committee, we wish you all a pleasant stay at Zlatibor and a productive conference.

Prof. Nenad Filipović, Conference Program Chair

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FUZZY C-MEANS OVER NODE EMBEDDINGS OUTPERFORMS LEIDEN FOR OVERLAPPING COMMUNITY DETECTION IN LARGE-SCALE CUSTOMER GRAPHS

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Abstract:

Graph clustering and machine learning algorithms can be valuable in analyzing complex social, biological or engineering networks by uncovering densely connected node groups called communities. Graph-based customer segmentation often involves overlapping communities, a scenario where crisp partitioning algorithms can mis-represent user behaviour. We therefore benchmark a soft method Fuzzy C-Means (FCM) applied to node-embedding vectors (Node2Vec, 128 dims) against two hard baselines, Leiden and Louvain, and one overlapping baseline, BigCLAM, all running inside Neo4j. Experiments use three public network datasets from Kaggle along with 50 synthetic graphs with planted overlaps of 10–30%. Clustering quality is measured with Overlap-NMI, Omega-Index, and Fuzzy-ARI; scores are averaged over the graph ensemble and assessed with paired bootstrap tests. FCM delivers the best mean Overlap-NMI and Fuzzy-ARI, significantly outperforming Leiden and Louvain, while matching BigCLAM yet running 2–3× faster on 100 k-node graphs. The results confirm that FCM's membership grades capture nuanced, cross-segment affinities that crisp modularity maximisers overlook. We discuss parameter-selection symmetry, scalability, and privacy-preserving deployment, and outline next steps: validating on proprietary e-commerce graphs, exploring fuzzy variants of Infomap, and integrating uncertainty-aware embeddings to further improve customer insight.

Keywords: Fuzzy C-Means, node-embedding vectors, graphs.

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