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# Book of Abstracts

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

May 29-30, 2025, Zlatibor, Serbia

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

**May 29-30, 2025, Zlatibor, Serbia**

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

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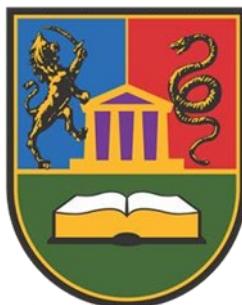
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# Welcome Message

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 29<sup>th</sup>-30<sup>th</sup>, 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

# Organizing Committee

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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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