

Zahiriddin Rustamov

Dual-Award PhD Student

United Arab Emirates University, Al Ain, UAE | KU Leuven, Belgium

contact@zahiriddin.com

zahiriddin.com | [Google Scholar](#) | [ORCID](#) | [LinkedIn](#)

Research Interests

Data selection and pruning for deep learning, graph-based instance selection, submodular optimization, and foundation-model-driven representation learning. Current work develops dual-space selection methods that combine target-aware coverage in foundation feature space with training-aware diversity in gradient space, with applications across image classification, medical imaging, and text classification.

Education

- Aug 2023 -- Present **Doctor of Philosophy (Dual-Award)**
UAEU, Al Ain, UAE (CGPA: 4.00/4.00) | KU Leuven, Belgium (LAGoM NLP)
Thesis: Graph-based and submodular methods for data selection in deep learning
Advisors: Prof. Nazar Zaki (UAEU); Prof. Miryam de Lhoneux (KU Leuven)
- Oct 2021 -- Sep 2022 **Master of Data Science**
University of Malaya, Kuala Lumpur, Malaysia | CGPA: 4.00/4.00
- May 2019 -- Jul 2021 **Bachelor of Information Technology (Hons), Software Systems Development**
Tunku Abdul Rahman University of Management and Technology, Kuala Lumpur, Malaysia | CGPA: 3.96/4.00
- May 2017 -- May 2019 **Diploma in Science (Computer Science and Management Mathematics)**
Tunku Abdul Rahman University of Management and Technology, Kuala Lumpur, Malaysia | CGPA: 3.92/4.00

Publications

Selected Publications

1. **Rustamov, Z.**, Zaitouny, A., & Zaki, N. (2025). Scalable graph attention-based instance selection via mini-batch sampling and hierarchical hashing. *AI Open*. doi:10.1016/j.aiopen.2025.08.004
2. **Rustamov, Z.**, Zaki, N., Rustamov, J., Zaitouny, A., & Damseh, R. (2024). Graph reduction techniques for instance selection: Comparative and empirical study. *Artificial Intelligence Review*, 58(2), 62. doi:10.1007/s10462-024-10971-4
3. **Rustamov, Z.**, Zaitouny, A., Damseh, R., & Zaki, N. (2024). GAIS: A novel approach to instance selection with graph attention networks. *IEEE International Conference on Knowledge Graph (ICKG 2024)*, Abu Dhabi, UAE, 309–316. doi:10.1109/ICKG63256.2024.00046
4. **Rustamov, Z.**, Lakas, A., & Zaki, N. (2024). GAT-RWOS: Graph attention-guided random walk oversampling for imbalanced data classification. *IEEE International Conference on Knowledge Graph (ICKG 2024)*, Abu Dhabi, UAE, 317–324. doi:10.1109/ICKG63256.2024.00047

Manuscripts Under Review

1. **Rustamov, Z.**, Rustamov, J., Damseh, R., & Zaki, N. (2026). One-Shot Data Selection for Medical Image Classification via Graph Coverage. *Under review at MICCAI 2026*.

Peer-Reviewed Journal Articles

1. Badawi, N., Rustamov, J., **Rustamov, Z.**, Lesage, F., Zaki, N., & Damseh, R. (2025). Improving microvascular brain analysis with adversarial learning for OCT-TPM vascular domain translation. *Scientific Reports*, 15(1), 25182. doi:10.1038/s41598-025-07410-x
2. Balakrishnan, V., **Rustamov, Z.**, Ramanathan, G., & Lim, J.L. (2025). A decade's overview of artificial intelligence in diagnosing: A scoping review. *International Journal of Machine Learning and Cybernetics*, 16(5), 3131–3148. doi:10.1007/s13042-024-02440-9
3. Iratni, M., Abdullah, A., Aldhaheeri, M., Elharrouss, O., Abd-Alrazaq, A., **Rustamov, Z.**, Zaki, N., & Damseh, R. (2025). Transformers for neuroimage segmentation: Scoping review. *Journal of Medical Internet Research*, 27, e57723. doi:10.2196/57723

4. Parambil, M.M.A., Rustamov, J., Ahmed, S.G., **Rustamov, Z.**, Awad, A.I., Zaki, N., & Alnajjar, F. (2024). Integrating AI-based and conventional cybersecurity measures into online higher education settings: Challenges, opportunities, and prospects. *Computers and Education: Artificial Intelligence*, 7, 100327. doi:10.1016/j.caeai.2024.100327
5. Rustamov, J., **Rustamov, Z.**, Mohamad, M.S., Zaki, N., Al Tenaiji, A., Al Harbi, M., & Al Jasmi, F. (2024). An expert rule-based approach for identifying infantile-onset Pompe disease patients using retrospective electronic health records. *Scientific Reports*, 14(1), 21523. doi:10.1038/s41598-024-72259-5
6. Turaev, S., Babu, A., Al-Dabet, S., Rustamov, J., **Rustamov, Z.**, Zaki, N., Mohamad, M.S., & Loo, C.K. (2024). Data-driven analysis of patients' body language in healthcare: A comprehensive review. *IEEE Access*, 12, 16514–16548. doi:10.1109/ACCESS.2024.3358398
7. Zaki, N., Krishnan, A., Turaev, S., **Rustamov, Z.**, Rustamov, J., Almusalami, A., Ayyad, F., Regasa, T., & Iriho, B.B. (2024). Node embedding approach for accurate detection of fake reviews: A graph-based machine learning approach with explainable AI. *International Journal of Data Science and Analytics*, 18(3), 295–315. doi:10.1007/s41060-024-00565-2
8. Babu, A., **Rustamov, Z.**, & Turaev, S. (2023). Intelligent touchless system based on gesture recognition. *Journal of Theoretical and Applied Information Technology*, 101(10), 3936–3942.
9. Rustamov, J., **Rustamov, Z.**, & Zaki, N. (2023). Green space quality analysis using machine learning approaches. *Sustainability*, 15(10), 7782. doi:10.3390/su15107782
10. Turaev, S., Al-Dabet, S., Babu, A., **Rustamov, Z.**, Rustamov, J., Zaki, N., Mohamad, M.S., & Loo, C.K. (2023). Review and analysis of patients' body language from an artificial intelligence perspective. *IEEE Access*, 11, 62140–62173. doi:10.1109/ACCESS.2023.3287788

Peer-Reviewed Conference Papers

1. Badawi, N., Rustamov, J., **Rustamov, Z.**, Lesage, F., Zaki, N., & Damseh, R. (2024). Generative adversarial learning for OCT–TPM vascular domain translation. *IEEE International Symposium on Biomedical Imaging (ISBI 2024)*, Athens, Greece, 1–5. doi:10.1109/ISBI56570.2024.10635552
2. Rustamov, J., **Rustamov, Z.**, Badawi, N., Lesage, F., Zaki, N., & Damseh, R. (2024). Learning-based MRI response predictions from OCT microvascular models to replace simulation-based frameworks. *Medical Image Understanding and Analysis (MIUA 2024)*, Manchester, UK, 54–67. doi:10.1007/978-3-031-66955-2_4
3. **Rustamov, Z.**, Rustamov, J., Parambil, M.M.A., Ahmed, S.G., & Turaev, S. (2024). Towards seamless sidewalk navigation: On-device machine learning for real-time obstacle detection in visually impaired assistance. In *Advancements in Smart Computing and Information Security (ASCIS 2023)*, CCIS vol. 2037 (pp. 358–365). Springer. doi:10.1007/978-3-031-58604-0_26
4. **Rustamov, Z.**, Rustamov, J., Sultana, M.S., Ywei, J., Balakrishnan, V., & Zaki, N. (2023). Cardiovascular disease prediction using ensemble learning techniques: A stacking approach. *IEEE International Colloquium on Signal Processing & Applications (CSPA 2023)*, Kedah, Malaysia, 93–98. doi:10.1109/CSPA57446.2023.10087730
5. **Rustamov, Z.** (2022). Clustering and association rule mining of cardiovascular disease risk factors. In *Advancements in Smart Computing and Information Security (ASCIS 2022)*, CCIS vol. 1759 (pp. 389–396). Springer. doi:10.1007/978-3-031-23092-9_31

Book Chapters

1. Albreiki, B., **Rustamov, Z.**, Rustamov, J., & Zaki, N. (2024). Enhancing predictive performance in identifying at-risk students: Integration of topological features, node embeddings in machine learning models. In *Machine Learning in Educational Sciences: Approaches, Applications and Advances* (pp. 183–204). Springer. doi:10.1007/978-981-99-9379-6_10

Preprints

1. Rustamov, J., **Rustamov, Z.**, Badawi, N., Damseh, R., Al Jasmi, F., & Zaki, N. (2024). Benchmarking outlier detection algorithms in healthcare: An analysis across diverse medical datasets. *Research Square*. doi:10.21203/rs.3.rs-5242162/v1
2. **Rustamov, Z.**, Rustamov, J., Zaki, N., Turaev, S., Sultana, M.S., Tan, J.Y., & Balakrishnan, V. (2023). Enhancing cardiovascular disease prediction: A domain knowledge-based feature selection and stacked ensemble machine learning approach. *Research Square*. doi:10.21203/rs.3.rs-3068941/v1

Awards & Fellowships

- Aug 2023 **PhD Full Fellowship**, United Arab Emirates University — full and continuous financial support across the PhD program.
- Feb 2022 **TAR UC Book Prize** for outstanding performance in the Bachelor of Information Technology (Hons), academic year 2020/2021.
- Jun 2019 **TAR UC Book Prize** for outstanding performance in the Diploma in Science, academic year 2018/2019.

Software

- 2024 -- Present **GAIS** — Python package for graph attention-based instance selection. github.com/zahiriddin-rustamov/gais
- 2024 -- 2025 **GAT-RWOS** — Graph attention-guided random walk oversampling for imbalanced data classification. github.com/zahiriddin-rustamov/gat-rwos

Research Experience

- Aug 2023 -- Present **Research Assistant**, ASPIRE Precision Medicine Virtual Research Institute (APMAD), Al Ain, UAE
Web infrastructure development and maintenance; institute-level research support.
- Jan 2021 -- Jun 2021 **Software Developer Intern**, Consolsys Technologies Sdn Bhd, Kuala Lumpur, Malaysia
Backend development, automated reporting, software testing.

Teaching Experience

- Aug 2023 -- Present **Adjunct Faculty**, United Arab Emirates University, Al Ain, UAE
Lab instructor for CSBP121 (Programming Lab I); ~30 students per section, taught every semester since Fall 2023.

Talks & Presentations

- Dec 2024 “GAIS: A Novel Approach to Instance Selection with Graph Attention Networks” and “GAT-RWOS: Graph Attention-Guided Random Walk Oversampling for Imbalanced Data Classification.” *IEEE International Conference on Knowledge Graph (ICKG 2024)*, Abu Dhabi, UAE.
- Dec 2023 “Towards Seamless Sidewalk Navigation: On-Device Machine Learning for Real-Time Obstacle Detection.” *ASCIS 2023*, Marwadi University, Rajkot, India.
- Mar 2023 “Cardiovascular Disease Prediction using Ensemble Learning Techniques: A Stacking Approach.” *IEEE CSPA 2023*, Kedah, Malaysia.
- Nov 2022 “Clustering and Association Rule Mining of Cardiovascular Disease Risk Factors.” *ASCIS 2022*, Marwadi University, Rajkot, India.

Professional Service

- 2023 -- Present **Peer Reviewer** — *IEEE Access* (Aug 2023 – Present), *Heliyon* (Dec 2023 – Present), *Scientific Reports* (Apr 2026 – Present).

References

Available upon request.