

Ayhan Suleymanzade

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Education

Korea Advanced Institute of Science and Technology (KAIST) <i>B.S. in Computer Science and Electrical Engineering - cGPA 4.17/4.30 (98.70/100)</i>	<i>South Korea</i> <i>Sep 2021 - Dec 2025</i>
Technical University of Munich (TUM) <i>Exchange Program in Informatics - cGPA 1.0/5.0 (100/100)</i>	<i>Germany</i> <i>Apr 2025 - Aug 2025</i>

Publications

(P: preprint, C: conference, J: journal, W: workshop, *: equal contribution)

- [P1] **Limits of Continuous Chain-of-Thought in Multi-Step and Multi-Chain Reasoning**
Ayhan Suleymanzade*, Andreas Bergmeister*, Stefanie Jegelka
Preprint; To Appear in AAAI 2026 Bridge on Logical and Symbolic Reasoning in Language Models
- [C3] **Diffusion Models Through a Global Lens: Are They Culturally Inclusive?**
Zahra Bayramli*, Ayhan Suleymanzade*, Na Min An, Huzama Ahmad, Eunsu Kim, Junyeong Park, James Thorne, Alice Oh
ACL 2025 (Oral Presentation)
- [C2] **Revisiting Random Walks for Learning on Graphs**
Jinwoo Kim, Olga Zaghen*, Ayhan Suleymanzade*, Youngmin Ryou, Seunghoon Hong
ICLR 2025 (Spotlight Presentation)
- [C1] **Learning Probabilistic Symmetrization for Architecture Agnostic Equivariance**
Jinwoo Kim, Tien Dat Nguyen, Ayhan Suleymanzade, Hyeokjun An, Seunghoon Hong
NeurIPS 2023 (Spotlight Presentation)

Research Experience

AITHYRA <i>Visiting Research Intern (Mentors: Prof. Ismail Ceylan, Prof. Micheal Bronstein)</i>	<i>Austria</i> <i>Dec 2025 - Aug 2026</i>
<ul style="list-style-type: none">Expected to develop latent-reasoning and hybrid continuous-discrete generative models for biomolecular structures.	
TUM Foundation of Deep Neural Networks Lab <i>Visiting Research Intern (Mentor: Prof. Stefanie Jegelka)</i>	<i>Germany</i> <i>Apr 2025 - present</i>
<ul style="list-style-type: none">Designed depth and diversity controlled reasoning benchmarks showing that continuous and implicit CoT models collapse by up to 80–95% accuracy as reasoning depth or chain multiplicity increases [P1].Identified credit-assignment and mode-collapse failures in latent alignment and proposed intermediate supervision to sustain multimodal reasoning dynamics [P1].	
KAIST System Intelligence Lab <i>Undergraduate Research Intern (Mentors: Minsu Kim, Prof. Jinkyoo Park)</i>	<i>South Korea</i> <i>Jul 2024 - Dec 2024</i>
<ul style="list-style-type: none">Developed the Learnable Local Search GFlowNet (LLS-GFN), introducing a joint training objective combining Maximum Likelihood Estimation and full Trajectory Balance to improve local search and mode-seeking capabilities.Achieved 2.3% stronger reward accumulation across tasks such as DNA, molecule, fragment, and RNA optimization.	
KAIST Vision and Learning Lab <i>Undergraduate Research Intern (Mentors: Jinwoo Kim, Prof. Seunghoon Hong)</i>	<i>South Korea</i> <i>Feb 2023 - Jul 2024</i>
<ul style="list-style-type: none">Proposed an automorphism-invariant graph learning pipeline using random walk embeddings and analyzed its expressive power theoretically and empirically [C2].Developed a probabilistic symmetrization method for real-world graphs and adapted Vision Transformer insights for graph tasks, yielding competitive benchmarks (0.1355 → 0.3287 Hits@1) in PCQM-Contact [C1].	

Work Experience

Mercari Inc. <i>Machine Learning Engineer Intern</i>	<i>Japan</i> <i>Jan 2025 - Mar 2025</i>
<ul style="list-style-type: none">Built a scalable text embedding pipeline with Apache Beam and GCS, improving storage efficiency by 5.3x, speed by 11.4x, and search reranking NDCG by 2.46%.Contributed to migrating the training pipeline from TensorFlow to PyTorch Lightning, deployed new features via Kubernetes, improved experimentation with Hydra, and optimized Docker builds 6.7x.	
StoneLab Inc. <i>AI Researcher and Developer</i>	<i>South Korea</i> <i>Jan 2024 - July 2024</i>
<ul style="list-style-type: none">Developed text-constrained music generation models for content creation on music platforms and engineered a high-	

- performance streamer for MusicGen, achieving a 9x increase in inference speed.
- Migrated codebases to Keras 3 and enabled multi-framework deployment using FastAPI and Flask.

EverEx Inc.

South Korea

Computer Vision Research Intern (Mentor: [Byung-Hoon Kim](#))

Dec 2022 - Feb 2023

- Replicated and extended prior work by Gong et al. and Choi et al., proposing a hybrid model combining Diffusion and Graph Convolutional Networks.
- Achieved state-of-the-art MPJPE of 8.93 mm (Walking) and 12.22 mm (Jogging) on HumanEva-I, improving baseline by 1.4 mm and 0.9 mm.

Awards

- KAIST Q-day Award [Advanced Research] (2025)
- KAIST Dean's List (Fall 2024)*
- KAIST Dean's List (Spring 2024)*
- KAIST Alumni Fellowship (2024)
- KAIST Presidential Fellowship (2024)
- KAIST College of Engineering Leadership Award (2024)
- KAIST Dean's List (Fall 2023)*
- KAIST Global Leadership Award [Challenge] (2023)
- KAIST Dean's List (Fall 2022)*
- International Physics Olympiad (IPhO) – 1 Bronze & 1 HM (2020–2021)
- National Physics Olympiad – 2 Gold (2020–2021)
- International Olympiad on Astronomy and Astrophysics (IOAA) – 1 HM (2020)
- International Junior Science Olympiad (IJSO) – Silver Medal (2019)

*: Top 3% of College of Engineering in four semesters.

Professional Service

Ministry of Education of Azerbaijan

Azerbaijan

National Coach, Coordinator, Leader

Sep 2021 - Present

- Conducting intensive training camps, preparing handouts, proposing problems, and teaching various topics.
- Serving as a Leader at International venues (IPhO, EuPhO) and as jury member in Azerbaijan National Physics Olympiad, preparing and grading exams for national exams and team selection tests.

Teaching Assistant (TA), KAIST

- Foundations of Big Data Analytics (EE412) Fall 2024
- Introduction to Deep Learning (CS492I) Fall 2023

Projects

GFN-Check: Diverse Valid Test Inputs with Generative Flow Networks

Fall 2024

AI Based Software Engineering

- Designed GFlowNet-based framework for diverse, valid input generation, addressing RL overfitting and storage issues.
- Outperformed RLCheck in diversity metrics on BST and Maven POM XML tasks.

Bridging Soft RL and GFlowNets

Spring 2024

Deep Reinforcement Learning and Game AI

- Uncovered theoretical link between Soft RL and GFlowNets, enabling principled integration of advanced RL techniques within GFlowNets framework.
- Developed dynamic regularization and integrated PCL/Multi-step PCL methods, improving convergence stability, achieving 60× efficiency gains, and increasing mode coverage by 4%.

Exploring Mental Well-Being in Gaming

Spring 2024

Computational Social Science

- Developed tree-based models (RF, GBM, EBM) on data from 13k+ gamers, achieving 80% accuracy in detecting mental well-being and delivering 30–35% performance gains over regression-based baselines.
- Validated findings through a KAIST survey and analyzed feature importance, identifying gaming hours and motivation to play as key mental health factors.

Scaling Transformers to Large Graphs

Spring 2023

Graph ML and Mining

- Applied pure Transformer for node classification via distillation from a pretrained GNN.
- Outperformed GCN/GAT on Cora-ML, DBLP, PubMed, Wiki-CS by 1-3% node classification accuracy while alleviating oversmoothing and oversquashing.

Semi-Supervised Semantic Segmentation with CCT

Fall 2022

Introduction to AI

- Developed CCT-based segmentation model with shared encoder and 40 auxiliary decoders.
- Integrated Temporal Ensembling and GAN regularization, improving PASCAL VOC mIoU from 73.2 to 73.5.

References

Prof. Stefanie Jegelka, Humboldt Professor at TUM
Prof. Seunghoon Hong, Associate Professor at KAIST
Prof. Alice Oh, Professor at KAIST

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