

Sejin Kim

Postdoctoral Researcher
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EDUCATION

Mar. 2017 ~ Feb. 2023	Korea Advanced Institute of Science and Technology School of Computing	Daejeon, Korea
Thesis: Region-Level Spatio-Temporal Prediction Based on Transfer Learning for Data-Poor Cities <i>Advisor: Jae-Gil Lee</i>		
Sep. 2013 ~ Aug. 2016	Korea Advanced Institute of Science and Technology School of Computing	Daejeon, Korea
Thesis: Design and implementation of cost-based query optimization for Odysseus/OOSQL <i>Advisor: Kyu-Young Whang</i>		
Feb. 2009 ~ Aug. 2013	Korea Advanced Institute of Science and Technology School of Computing	Daejeon, Korea
<i>B.S. in Computer Science</i>		

RESEARCH EXPERIENCES

- Postdoctoral Researcher at AI Graduate School, Gwangju Institute of Science and Technology, Korea (Apr. 2023 ~ Present)
- Researcher at GraphAI Research, GraphAI Co. Ltd., Korea (Feb. 2023 ~ Mar. 2023)
- Researcher at Advanced Information Technology Research Center, Korea Institute of Science and Technology, Korea (Sep. 2016 ~ Feb. 2017)

WORKING EXPERIENCES

- GIST AI Graduate School** - Postdoctoral Researcher, Apr. 2023 - Present
- WITLab** - Lecturer for Korea Olympiad in Informatics (KOI), Mar. 2017 - Feb. 2023
- GraphAI Labs** - AI Reseracher, Feb. 2023 - Mar. 2023
- KAIST AITRC** - DB Researcher, Sep. 2016 - Aug. 2017

RESEARCH INTERESTS

- Human-like AI
- Artificial general intelligence
- Reinforcement learning
- Program synthesis
- Trajectory analysis

CONFERENCES

1. Kim, S.*, Choi, H., Lee, S., Kim, S.†, (2026), "ARCTraj: A Dataset and Benchmark of Human Reasoning Trajectories for Abstract Problem Solving", KDD Datasets and Benchmarks.
2. Park, J.* , Park, J., Shim, J., Kim, S., Vennemann, P., Kim, S.†, (2025), "Composed Program Induction with Latent Program Lattice", NeurIPS NeurReps Workshop.
3. Park, J.* , Kim, Y., Kim, S., Lee, B.J., Kim, S.†, (2025), "Diffusion-model-guided Implicit Q-learning with Adaptive Revaluation", CoRL LEAP Workshop.
4. Kim, S.*, Lee, H., Kim, S.†, (2025), "Addressing and Visualizing Misalignments in Human Task-Solving Trajectories", KDD. (*top conference, acceptance rate: 18.4%*)
5. Kim, S.*, Lee, H., Kim, S.†, (2025), "Addressing and Visualizing Misalignments in Human Task-Solving Trajectories", ICLR Bi-Align Workshop.
6. Kim, S.*, Kim, S.†, (2024), "System-2 Reasoning via Generality and Adaptation", NeurIPS S2R Workshop.
7. Lee, S.* , Sim, W.* , Shin, D., Kim, S., Kim, S.†, (2024), "Reasoning Abilities of Large Language Models through the Lens of Abstraction and Reasoning", NeurIPS S2R Workshop.
8. Shim, S.* , Ko, D.* , Lee, H., Lee, S., Song, D., Hwang, S., Kim, S., Kim, S.†, (2024), "O2ARC 3.0: A Platform for Solving and Creating ARC Tasks", IJCAI Demo.
9. Lee, J.* , Sim, W.* , Kim, S.†, Kim, S.† (2024), "Enhancing Analogical Reasoning in the Abstraction and Reasoning Corpus via Model-Based RL", IJCAI IARML Workshop.
10. Lee, H.* , Kim, S.* , Lee, S., Hwang, S., Lee, J., Lee, B.†, Kim, S.†, (2024), "ARCLE: The Abstraction and Reasoning Corpus Learning Environment for Reinforcement Learning", CoLLAs.
11. Park, J.* , Im, J.* , Hwang, S.* , Lim, M.* , Ualibekova, S., Kim, S., Kim, S.†, (2023), "Unraveling the ARC Puzzle: Mimicking Human Solutions with Object-Centric Decision Transformer", ICML ILHF Workshop.
12. Kim, S.* , Song, H., Kim, S., Lee, J.-G.†, (2020), "Revisit Prediction by Deep Survival Analysis", PAKDD.
13. Yea, S.-G.* , Kim, S., TO, J.-M., Lee, J.-G.†, (2016), "SentiWorld: Understanding Emotions between Countries Based on Tweets", ICWSM Demo.

JOURNALS

1. Lee, S.* , Sim, W.* , Shin, D., Hwang, S., Seo, W., Park, J., Lee, S., Kim, S., Kim, S.†, (2025), "Reasoning Abilities of Large Language Models: In-Depth Analysis on the Abstraction and Reasoning Corpus", *ACM Transactions on Intelligent Systems and Technology*, 16(6), 1–52.
2. Hwang, S.* , Lee, S., Kim, S.†, Kim, S.†, (2025), "Solution Augmentation for ARC Problems Using GFlowNet: A Probabilistic Exploration Approach", *Transactions on Machine Learning Research*.
3. Whang, K.-Y.* , Na, I., Yun, T.-S., Park, J.-A., Cho, K.-H., Kim, S., Yi, I., Lee, B.-S., (2020), "Building Social Networking Services Systems using the Relational Shared-Nothing Parallel DBMS", *Data & Knowledge Engineering*, 125, 101756.

PREPRINTS

1. **Kim, S.***, Kim, S.†, (2026), "System 2 Reasoning for Human-AI Alignment: Generality and Adaptivity via ARC-AGI", ICML Position Paper Track. (*submitted*)
2. Cho, G.*, Im, J., Lee, J., Yi, H., **Kim, S.**†, Kim, S.†, (2026), "TRACED: Transition-aware Regret Approximation with Co-learnability for Environment Design", ICLR. (*submitted*)
3. Rusli, M.*, Shin, D., **Kim, S.**, Kim, S.†, (2025), "Tracing and Correcting Programs: Critic-Guided Synthesis for Visual Reasoning". Data Mining and Knowledge Discovery Journal. (*submitted*)
4. Liyew, W.*, Lee, S., **Kim, S.**, Kim, S.†, (2025), "Evolving and Refining Code: A Neuro-Evolutionary Program Synthesis for Compositional Reasoning".
5. Jeon, J.*, Shim, S., **Kim, S.**†, Kim, S.†, Lee, B.†, (2025), "Neural MCTS with LLM Guidance for Effective Program Synthesis on Abstraction and Reasoning Corpus". Machine Learning Journal. (*submitted*)
6. Kim, Y.*, Park, J., Kim, H., **Kim, S.**, Lee, B., Kim, S.†, (2024), "Diffusion-Based Offline RL for Improved Decision-Making in Augmented ARC Task", arXiv:2410.11324.

PATENTS

1. Cho, G., Im, J., Kim, S., **Kim, S.**, "METHODS AND SYSTEMS FOR LEARNING BASED ON DIFFICULTY AND MUTUAL LEARNING", KR-Application No. 10-2025-0160737
2. Park, J., Kim, S., **Kim, S.**, Kim, Y., "METHOD FOR TRAINING AN ADAPTIVE RE-EVALUATION-BASED EXECUTION SYSTEM", KR-Application No. 10-2025-0148979
3. Kim, Y., Kim, S., **Kim, S.**, Kim, H., Park, J., "METHOD AND SYSTEM FOR RULE-BASED SYNTHETIC DATA GENERATION OFFLINE REINFORCEMENT LEARNING", KR-Application No. 10-2025-0148978
4. **Kim, S.**, Lee, H., Kim, S., "METHOD AND SYSTEM FOR AN INTENTION ESTIMATION IN HUMAN PROBLEM-SOLVING TRAJECTORIES", KR-Application No. 10-2025-0135338
5. Lee, H., **Kim, S.**, Kim, S., "METHOD AND SYSTEM FOR IMPLEMENTING A REINFORCEMENT LEARNING ENVIRONMENT CAPABLE OF SOLVING ABSTRACTION AND REASONING CHALLENGE", KR-Application No. 10-2024-0101165
6. Lee, J.-G., Lee, C., Kim, J., **Kim, S.**, "RETRIEVAL SYSTEM FOR GEOSOCIAL NETWORKS AND METHOD OF THE SAME", KR-Registration No. 10-2055900-0000

INVITED TALKS

- Korea Software Congress (KSC), Early-Career Researcher Session, Korea, 2025.
- Sunchon National University (SCNU), Colloquium, Korea, 2025.
- Gwangju Institute of Science and Technology (GIST), AI Colloquium, Korea, 2025.
- Ulsan National Institute of Science and Technology (UNIST), Korea, 2025.
- Gwangju Institute of Science and Technology (GIST), AXEL Camp, Korea, 2025.
- Korea Disease Control and Prevention Agency (KDCA), DIDCS Workshop, Korea, 2025.
- University of British Columbia (UBC), EECE Seminar, Canada, 2024.

AWARDS AND HONORS

- **Outstanding Reviewer**, KDD 2025
Selected as a Top 10% reviewer for the ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2025.

- **Postdoctoral Fellowship Recipient**, NRF
Awarded a competitive 2-year fellowship for the project Developing Abstraction and Reasoning Capability for AI Model as Principal Investigator, National Research Foundation of Korea, Sept 2024 - Aug 2026.
- **Excellence Award**, GIST
Recognized for outstanding research achievements among postdoctoral researchers, Gwangju Institute of Science and Technology, Korea, 2024.

CONFERENCES (DOMESTIC)

1. Lee. J.*, Lee. S., Kim, S.†, Kim, S.†, (2023), "Extracting the Core Knowledge of ARC with the World Model", Korea Software Congress.
2. Gu, G.* , Sim, W., Im, J., Kim, S., Kim, S.†, (2023), "Using Contrastive Learning for Abstraction and Reasoning Task", Korea Software Congress.
3. Lee. H.* , Kim, S., Kim, S.†, (2023), "ARCLE: Gymnasium Environment for Abstraction and Reasoning Corpus", Korea Software Congress.
4. Park., J.* , Im., J., Lee, Y., Shin, D., Kim, S., Kim, S.†, (2023), "Abstraction and Reasoning Challenge with Decision Transformer", Korea Computer Congress.
5. Sim, W.* , Jin, H., Kim, S., Kim, S.†, (2023), "The Possibility of Prompt Engineering for ARC Problem Solving", Korea Computer Congress.
6. Shin, Y.* , Park, D., Kang, J., Kim, S.†, (2022), "Contrastive Learning with Segment Supervision for Semi-Supervised Time Series Classification", Korea Software Congress.
7. Kim, B.* , Na, J., Byun, Y., Kim, S., Lee., J.-G.†, (2022), "Autoencoder ODEs for Time Series Anomaly Detection", Korea Software Congress.
8. Kim, J.* , Kim, D., Kim, S., Kang, J., Park, D., Lee., J.-G.†, (2022), "Performance Comparison of Self-Driving Models With and Without LIDAR Sensors Based on Reinforcement Learning in AWS DeepRacer Platform ", Korea Computer Congress.
9. Trirat, P.* , Shin, Y., Kim, S.†, Kim, M.†, (2021), "Generating a Machine Learning Model with a Few Sentences", Korea Software Congress.
10. Kim, B.* , Kim, S., Kim, S., Lee, J.-G.†, (2019), "Customer Revisit Prediction Using Macroscale Mobility Information", Korea Software Congress.
11. Kim, S.* , (2018), "A Comparison of Implementation Method of Spatial Operator in Spatial OLAP ", Korea Computer Congress.

JOURNALS (DOMESTIC)

1. Sim, W.* , Jin, H., Kim, S., Kim, S.†, (2024), "The Possibility of Prompt Engineering for ARC Problem Solving", KIISE Transactions on Computing Practices.

ACADEMIC SERVICES

- **Program Committee Member**, AAAI 2026; AAAI AI Alignment Track 2026
- **Program Committee Member**, KDD 2025; KDD 2026
- **Session Chair**, KDD 2025
- **Journal Reviewer** (ACM Transactions on Intelligent Systems and Technology) 2025
- **Journal Reviewer** (IEEE Transactions on Knowledge and Data Engineering) 2022; 2023

TEACHING ASSISTANTS

- CS101 **Introduction to Programming**, School of Computing, KAIST
- CS360 **Introduction to Databases**, School of Computing, KAIST
- CS560 **Database Systems**, School of Computing, KAIST
- CS664 **Advanced Database Systems**, School of Computing, KAIST
- KSE525 **Data Mining and Knowledge Discovery**, Dept. of Knowledge Service Engineering, KAIST
- KSE625 **Analytical Methodologies for Big Data**, Dept. of Knowledge Service Engineering, KAIST