

Sejin Kim

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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> <i>Ph.D. in Computer Science</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> <i>M.S. in Computer Science</i>	
Feb. 2009 ~ Aug. 2013	Korea Advanced Institute of Science and Technology School of Computing	Daejeon, Korea
	<i>B.S. in Computer Science</i>	

WORK 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 reasoning and abstraction
- ARC-AGI and compositional generalization
- Program synthesis and neuro-symbolic learning
- Reinforcement learning with trajectory modeling
- Human-AI alignment through reasoning augmentation

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. (**top conference, acceptance rate: 29%**)
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. (**top conference, acceptance rate: 28%**)
3. Rusli, M.^{*}, Shin, D., **Kim, S.**, Kim, S.[†] (2026), "Tracing and Correcting Programs: Critic-Guided Synthesis for Visual Reasoning", AAAI LMReasoning Bridge Workshop.
4. Park, J.^{*}, Park, J., Shim, J., **Kim, S.**, Vennemann, P., Kim, S.[†] (2025), "Composed Program Induction with Latent Program Lattice", NeurIPS NeurReps Workshop.
5. Park, J.^{*}, Kim, Y., **Kim, S.**, Lee, B.J., Kim, S.[†] (2025), "Diffusion-model-guided Implicit Q-learning with Adaptive Revaluation", CoRL LEAP Workshop.
6. **Kim, S.**^{*}, Lee, H., Kim, S.[†] (2025), "Addressing and Visualizing Misalignments in Human Task-Solving Trajectories", KDD. (**top conference, acceptance rate: 18%**)
7. **Kim, S.**^{*}, Lee, H., Kim, S.[†] (2025), "Addressing and Visualizing Misalignments in Human Task-Solving Trajectories", ICLR Bi-Align Workshop.
8. **Kim, S.**^{*}, Kim, S.[†] (2024), "System-2 Reasoning via Generality and Adaptation", NeurIPS S2R Workshop.
9. 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.
10. 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.
11. 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.
12. 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.
13. 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.
14. Kim, S.^{*}, Song, H., **Kim, S.**, Lee, J.-G.[†] (2020), "Revisit Prediction by Deep Survival Analysis", PAKDD.
15. 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 2026 Position Paper Track. (*submitted*)
2. Liyew, W.*, Lee, S., **Kim, S.**, Kim, S.[†] (2026), "Evolving and Refining Code: A Neuro-Evolutionary Program Synthesis for Compositional Reasoning". GECCO 2026. (*submitted*)
3. Jeon, J.*, Shim, S., **Kim, S.**[†], Kim, S.[†], Lee, B.[†] (2026), "Neural MCTS with LLM Guidance for Effective Program Synthesis on Abstraction and Reasoning Corpus". Machine Learning Journal. (*submitted*)
4. Kim, Y.*, Park, J., Kim, H., **Kim, S.**[†], Lee, B., Kim, S. (2026), "Diffusion-Based Offline RL for Improved Decision-Making in Augmented ARC Task", KDD 2026. (*submitted*)

ACADEMIC SERVICES

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

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.

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

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.

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