

Sanghyun Lee

 Homepage |  Scholar |  lsh83210@kaist.ac.kr

RESEARCH INTERESTS

I am broadly interested in diffusion models, with a current focus on discrete diffusion models. My research particularly focuses on improving the efficiency, scalability, and reasoning capabilities of diffusion language models.

On the inference side, I am interested in test-time scaling, designing inference algorithms that effectively scale computation at generation time. On the training side, I am interested in modeling, developing architectures and formulations that enable efficient and scalable discrete diffusion learning.

EXPERIENCE

Krafton

Research Intern, Foundation Research Team

2025.06 – 2026.04

Seoul, South Korea

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST)

Integrated M.S.-Ph.D., Kim Jaechul Graduate School of AI

Advisor: Prof. Seungryong Kim

2025.09 – Present

Daejeon, South Korea

Korea Advanced Institute of Science and Technology (KAIST)

B.S. in Electronic Engineering, Minor in Mathematical Sciences

2019.03 – 2025.09

Daejeon, South Korea

PUBLICATIONS

Preprints

1. **Sanghyun Lee**, Chunsan Hong, Seungryong Kim, Jaewon Lee, Jongho Park, Dongmin Park. “**Looped Diffusion Language Models**”
* Will be archived soon.
2. Chunsan Hong*, **Sanghyun Lee***, Chieh-Hsin Lai, S. Hayakawa, Y. Takida, Yuki Mitsufuji, Seungryong Kim, J.C. Ye. “**Understanding and Accelerating the Training of Masked Diffusion Language Models**”
Preprint (arXiv), 2026. [\[link\]](#)

International Conference

1. **Sanghyun Lee**, Seungryong Kim, Jongho Park, Dongmin Park. “**Lookahead Unmasking Elicits Accurate Decoding in Diffusion Language Models**”
International Conference on Machine Learning (ICML), 2026. [\[link\]](#)
2. Chunsan Hong, **Sanghyun Lee**, J.C. Ye. “**Unifying Masked Diffusion Models with Various Generation Orders and Beyond**”
International Conference on Machine Learning (ICML), 2026. Spotlight Paper (Acceptance rate < 2.2%). [\[link\]](#)
3. **Sanghyun Lee**, Sunwoo Kim, Seungryong Kim, Jongho Park, Dongmin Park. “**Effective Test-Time Scaling of Discrete Diffusion through Iterative Refinement**”
International Conference on Machine Learning (ICML) workshop, 2026. [\[link\]](#)
4. Donghoon Ahn*, Jiwon Kang*, **Sanghyun Lee**, Jaewon Min, Minjae Kim, Wooseok Jang, Hyoungwon Cho, Sayak Paul, SeonHwa Kim, Eunju Cha, Kyong Hwan Jin, Seungryong Kim. “**A Noise Is Worth Diffusion Guidance**”
International Conference on Learning Representations (ICLR), 2026. [\[link\]](#)
5. Donghoon Ahn*, Jiwon Kang*, **Sanghyun Lee**, Minjae Kim, Jaewon Min, Wooseok Jang, Sangwu Lee, Sayak Paul, Susung Hong, Seungryong Kim. “**Fine-Grained Perturbation Guidance via Attention Head Selection**”
Advances in Neural Information Processing Systems (NeurIPS), 2025. [\[link\]](#)

RESEARCH AREAS

- Discrete diffusion models

- Test-time scaling
- Probabilistic modeling
- Efficient from-scratch pretraining

SKILLS

- **Programming and Systems:** Python, PyTorch, C/C++, CUDA
- **Large-Scale Training Experience:**
 - 1B-scale language model from-scratch pretraining
 - Training experience on multi-GPU clusters
- **Academic Knowledge:** Diffusion Models, Reinforcement Learning Theory, Information Theory, Linear Algebra, MC Methods, Optimization Theory, Measure Theory, Real Analysis