

Jaehoon Chung

Computational Geometry and Algorithms for AI

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ABOUT ME

I am an AI Fellow (AI Assistant Professor) at the Center for AI and Natural Sciences of the Korea Institute for Advanced Study. My research is in theoretical computer science, with a focus on computational geometry, data structures, and algorithm design. I study how geometric and combinatorial structure can lead to efficient algorithms with provable guarantees. I am also interested in AI-assisted algorithm design, using learned predictions to improve practical performance without sacrificing theoretical guarantees.

RESEARCH INTERESTS

Computational Geometry

- Polygon partitioning, covering, containment, and approximation
- Lower-bound constructions in geometric optimization

Algorithmic Primitives for AI

- Distribution-aware nearest-neighbor search
- Weighted selection in sorted lists
- Geometric optimal transport

AI-Assisted Algorithm Design

- Learning-augmented methods for online scheduling
- Neural combinatorial optimization

RESEARCH EXPERIENCE

Korea Institute for Advanced Study (KIAS)	2026.09–Present
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AI Fellow (AI Assistant Professor), Center for AI and Natural Sciences

- Developing geometric and combinatorial algorithms for high-dimensional proximity search and algorithmic primitives in modern AI systems.

Korea Institute for Advanced Study (KIAS)	2025.09–2026.08
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Research Fellow, Center for AI and Natural Sciences

EDUCATION

Pohang University of Science and Technology	2020–2025
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M.S./Ph.D. (Integrated) in Computer Science and Engineering

- Advisor: Prof. Hee-Kap Ahn
- Ph.D. thesis: *Polygon Containment and Partition under Width Constraints*

Sogang University	2015–2020
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B.S. in Computer Science & Engineering

B.S. in Mathematics

Honors: Magna cum laude

EDUCATIONAL ACTIVITIES

International Research Experience

- TEEP Research Program, National Tsing Hua University, Taiwan 2024.08–2024.12
 - Research topic: Algorithms under Uncertainty
 - Advisors: Prof. Chung-Shou Liao and Prof. Kazuo Iwama

Teaching Assistant for Corporate AI Training Programs

- Hyundai Steel AI Expert 2020.09, 2021.11, 2022.09
- POSCO AI Expert 2021.08
- HuStar Innovation Academy 2022.06
- Youth AI·Big Data Academy 2022.11, 2023.03, 2023.08
- KITA AI Strategy Course for Elite Students 2023.07

SKILLS

Language

- Korean: Mother tongue
- English: Proficient in written and spoken communication

Programming

- C/C++
- Python

SCHOLARSHIPS & AWARDS

- Scholarship for Academic Excellence 2015
By Sogang University
- National Science & Technology Scholarship 2018–2020
By Korea Student Aid Foundation
- Bang Sung-Yang Graduate Fellowship 2020
By Pohang University of Science and Technology

PROJECTS

- Dynamic k-Nearest Neighbor Search in High-Dimensional Non-Euclidean Geometry 2025–Present
By KIAS
- NPU-Accelerated Libraries for Machine Learning 2025–2025
By Rebellions Inc.
- Auto Nesting Algorithm Development 2025–2025
By Samsung Heavy Industries
- Software Star Lab (Optimal Data Structure and Algorithmic Applications in Dynamic Geometric Environment) 2020–2024
By Institute of Information & Communications Technology Planning & Evaluation(IITP)
- Online Slab Yard Scheduling 2023–2024
By POSCO DX

PATENTS

1. “Slab Transfer System Using Virtual Slab Yard Simulator”
Korea Patent No. 10-2024-0201787, filed 2024, Patent pending, Hee-Kap Ahn, Jaegun Lee, **Jaehoon Chung**, Chaeyoon Chung, and Minju Song.
2. “GIS Information Retrieval Method Using Dynamic k-nearest Neighbor Search Algorithm In An Obstacle Environment”
U.S. Patent No. 63/294,069, filed 2021, Patent pending, Hee-Kap Ahn, Seungjun Lee, **Jaehoon Chung**, Hwi Kim, and Taekang Eom.
3. “GIS Information Retrieval Method Using Dynamic k-nearest Neighbor Search Algorithm In An Obstacle Environment”
Korea Patent No. 10-2730409, Registered 2024, Hee-Kap Ahn, **Jaehoon Chung**, Taekang Eom, Hwi Kim, and Seungjun Lee.

PUBLICATIONS

Conference

1. **Jaehoon Chung**, Orthogonal Strip Partitioning of Polygons: Lattice-Theoretic Algorithms and Lower Bounds. *In Proc. 20th Scandinavian Symposium on Algorithm Theory (SWAT)*, 2026. [pdf](#)
2. **Jaehoon Chung**, Kazuo Iwama, Chung-Shou Liao, and Hee-Kap Ahn. Minimum partition of polygons under width and cut constraints. *In Proc. 36th International Symposium on Algorithms and Computation (ISAAC)*, 2025. [pdf](#)
3. **Jaehoon Chung**, Sang Won Bae, Chan-Su Shin, Sang Duk Yoon, and Hee-Kap Ahn. Inscribing or circumscribing a histogram to a convex polygon. *In Proc. 42nd IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS)*, 2022. [pdf](#)
4. **Jaehoon Chung**, Sang Won Bae, Chan-Su Shin, Sang Duk Yoon, and Hee-Kap Ahn. Approximating convex polygons by histograms. *In Proc. 34th Canadian Conference on Computational Geometry (CCCG)*, 2022. [pdf](#)

Journal

1. **Jaehoon Chung**, Kazuo Iwama, Chung-Shou Liao, and Hee-Kap Ahn. Minimum partition of polygons under width and cut constraints. *Discrete & Computational Geometry*, 2026. Open access. [link](#)
2. **Jaehoon Chung**, Sang Won Bae, Chan-Su Shin, Sang Duk Yoon, and Hee-Kap Ahn. Inscribed and circumscribed histograms of a convex polygon. *Computational Geometry*, 2026. [link](#)
3. **Jaehoon Chung**, Sang Won Bae, Chan-Su Shin, Sang Duk Yoon, and Hee-Kap Ahn. Largest unit rectangles inscribed in a convex polygon. *Computational Geometry*, 2025. [link](#)

Article

1. Hee-Kap Ahn, **Jaehoon Chung**, and Mook Kwon Jung. “Nearest Neighbor Search Algorithm in Dynamic Environment.” *Journal of KIISE*, Vol. 42, No. 2, 2024. [link](#)

ACADEMIC ACTIVITIES

Invited Lectures and Talks

1. Invited talk at the Theoretical Computer Science (TCS) Seminar, Daegu Gyeongbuk Institute of Science and Technology (DGIST), Daegu, Korea, July 22, 2026.
Mathematical Structures in Width-Constrained Polygon Containment and Partitioning.
2. Invited lecture, “Nearest-Neighbor Search for Scientific Computing,” at The 17th KIAS CAC Summer School on Artificial Intelligence & Parallel Computing, Korea Institute for Advanced Study, Seoul, Korea, June 26, 2026. [link](#)

Workshop Presentations

1. Scheduled oral presentation at the 26th Korea–Japan Joint Workshop on Algorithms and Computation (WAAC 2026), Pusan National University, Busan, Korea, August 19–20, 2026.
Orthogonal Strip Partitioning of Simple Polygons: A Lattice-Theoretic Algorithm. [link](#)
2. Oral presentation at the KIAS CAINS Winter Workshop, Korea Institute for Advanced Study, Seoul, Korea, January 2026.
Presented research on nearest neighbor search on the hypersphere: methods, limits, and data-aware design.
3. Oral presentation at the Seorabeol Research Station: Clusters and Anomalies in Trajectory Streams (CM2LA 2025), POSTECH, Korea.
Presented recent research on strip partition of polygons under width constraints.
4. Oral presentation at the 23rd Japan–Korea Joint Workshop on Algorithms and Computation (WAAC 2023), Nagoya, Japan. [pdf](#)
Presented research on polygon containment and approximation.

Workshop Participation

1. Invited participant at the 26th Korean Workshop on Computational Geometry (KWCG 2026), Ruhr University Bochum, Germany, July 27–31, 2026. [link](#)
2. Invited participant at the 24th Korean Workshop on Computational Geometry (KWCG 2024), Kloster Weltenburg, Germany.
Engaged in discussions and collaborations on computational geometry research topics.

Reviewer

- International conferences: ICALP 2026, CCCG 2026, ESA 2025, SoCG 2024, ISAAC 2023, ISAAC 2021, WALCOM 2020
- Domestic conference: KCC 2024
- Journal: *Computational Geometry: Theory and Applications*
- Reviewer for Mathematical Reviews/MathSciNet 2026–present