Jongmin **Choi**

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Summary

I am a Ph.D. from POSTECH (Pohang University of Science and Technology), majoring in computational geometry (algorithms). In particular, I focus on reducing the time complexity of algorithms by slightly modifying data structures to fit the constraints of a given problem. For example, in 2021, I proposed an $O(n \log n)$-time algorithm for computing the Euclidean planar point 2-center. This matches the lower bound of the problem (closed) established in 1997. I was previously interested in parallel algorithms, but my recent interests have shifted to more practical concerns: reducing latency, increasing throughput, and minimizing memory usage in multi-threaded environments, as well as on GPUs.

Research Interests

Geometry Algorithms Nearest neighbor search / Clustering / Packing / Covering / k-center
Parallel Algorithm multi threading / practical algorithm / parametric search
GPU Optimization Memory optimization / Minimizing data transfer / latency and throughput

Education

POSTECH(Pohang University of Science and Technology) *Pohang, S.Korea*
M.S. and Ph.D in Computer Science and Engineering *Sep. 2016 - Feb. 2023*

- Dissertation : Optimal Planar Covering with Congruent Disks.
- Advisor: Hee-Kap Ahn

POSTECH(Pohang University of Science and Technology) *Pohang, S.Korea*
B.S. in Computer Science and Engineering *Mar. 2012 - Aug. 2016*

- Cum Laude.

Skills

Programming C++, Python, etc.
Algorithms Algorithm Design / Complexity Analysis / Numerical Analysis
Languages Korean (Native) / English (Available for work)

Industrial Experience

CryptoLab Inc. *Seoul, S.Korea*
Research Engineer, Solution Development Team *Oct. 2024 - now*

- Encrypted Vector Search Engine : ES2, Milvus
  - Go, C++, Cuda
  - Implement multi nodes, threads safe gpu homomorphic encrypted indexing program.
  - Add homomorphic encrypted vector data type to open source vector DB

Research Engineer, Homomorphic Encryption Team *Oct. 2022 - Oct. 2024*

- LLaMA and Resnet over HEaaN
  - C++, Cuda
  - Implmenting LLaMa2-7B over homomorphic encrytion
  - Implmenting Resnet Framework over homomorphic encrytion
  - Speed up matrix multiplication
- Optimize HEaaN : homomorphic encryption software
  - C++, python, Cuda
  - memory optimization
  - mathematic approximation functions optimization

SK hynix *Seongnam, S.Korea*
Intern, SSD firmware team *Jun. 2015 - Aug. 2015*

- Read Ubuntu NVMe protocol code and explain to others.

Publications

International Journals

1. Sang-Wook Lee, Jongmin Choi, Min-Je Park, Hajin Kim, Soo-Heang Eo, Garam Lee , Sulgi Kim, Jungyo Suh. Development of Privacy-Preserving Deep Learning Model with Homomorphic Encryption: A Technical Feasibility Study in Kidney CT Imaging. *Radiology: Artificial Intelligence, Submitted.*
2. Byeonguk Kang, Jongmin Choi, Hee-Kap Ahn. Intersecting Disks using Two Congruent Disks. *Computational Geometry, 110, 101966, Mar.2023.*
3. Jongmin Choi, Dahye Jeong, Hee-Kap Ahn. Covering Convex Polygons by Two Congruent Disks. *Computational Geometry, 109, 101936, Feb.2022.*
4. Taehoon Ahn, Jongmin Choi, Chaeyoon Chung, Hee-Kap Ahn, Sang Won Bae, Sang Duk Yoon. Rearranging a Sequence of Points onto a Line. *Computational Geometry*, 107, 101887, 2022.
5. Jongmin Choi, Sergio Cabello, Hee-Kap Ahn. Maximizing Dominance in the Plane and its Applications. *Algorithmica*, 83, pages 3491–3513, 2021.
6. Jongmin Choi, Hee-Kap Ahn. Efficient Planar Two-Center Algorithms. *Computational Geometry*, 97, 101768, 2021.
7. Hee-Kap Ahn, Sang Won Bae, Jongmin Choi, Matias Korman, Wolfgang Mulzer, Eunjin Oh, Ji-Won Park, André van Renssen, Antoine Vigneron. Faster Algorithms for Growing Prioritized Disks and Rectangles. *Computational Geometry: Theory and Applications*, 80, pages 23–39, 2019.
8. Hee-Kap Ahn, Taehoon Ahn, Sang Won Bae, Jongmin Choi, Mincheol Kim, Eunjin Oh, Chan-Su Shin, Sang Duk Yoon. Minimum-Width Annulus with Outliers: Circular, Square, and Rectangular Cases. *Information Processing Letters*, 145, pages 16–23, 2019.

International Conferences

1. Jongmin Choi, Jaegun Lee, Hee-Kap Ahn. Efficient k-Center Algorithms for Planar Points in Convex Position. *In Proc. 18th International Workshop on Algorithms and Data Structures (WADS 2023)*, pages 262–274, 2023.
2. Taehoon Ahn, Jongmin Choi, Chaeyoon Chung, Hee-Kap Ahn, Sang Won Bae, Sang Duk Yoon. Rearranging a Sequence of Points onto a Line. *33rd Canadian Conference on Computational Geometry (CCCG 2021)*, pages 36–46, 2021.
3. Jongmin Choi, Dahye Jeong, Hee-Kap Ahn. Covering Convex Polygons by Two Congruent Disks. *In Proc. 32nd International Workshop on Combinatorial Algorithms (IWOCA 2021)*, pages 165–178, 2021.
4. Byeonguk Kang, Jongmin Choi, Hee-Kap Ahn. Intersecting Disks using Two Congruent Disks. *In Proc. 32nd International Workshop on Combinatorial Algorithms (IWOCA 2021)*, pages 400–413, 2021.
5. Jongmin Choi, Sergio Cabello, Hee-Kap Ahn. Maximizing Dominance in the Plane and its Applications. *In Proc. 16th International Workshop on Algorithms and Data Structures (WADS 2019)*, pages 325–338, 2019.
6. Hee-Kap Ahn, Taehoon Ahn, Jongmin Choi, Mincheol Kim, Eunjin Oh. Minimum-Width Square Annulus Intersecting Polygons. *12th International Conference and Workshops on Algorithms and Computation (WALCOM 2018)*, pages 56–67, 2018.
7. Hee-Kap Ahn, Taehoon Ahn, Sang Won Bae, Jongmin Choi, Mincheol Kim, Eunjin Oh, Chan-Su Shin, Sang Duk Yoon. Minimum-Width Annulus with Outliers: Circular, Square, and Rectangular Cases. *12th International Conference and Workshops on Algorithms and Computation (WALCOM 2018)*, pages 44–55, 2018.
8. Hee-Kap Ahn, Sang Won Bae, Jongmin Choi, Matias Korman, Wolfgang Mulzer, Eunjin Oh, Ji-won Park, André van Renssen, Antoine Vigneron. Faster Algorithms for Growing Prioritized Disks and Rectangles. *In Proc. 28th International Symposium on Algorithms and Computation (ISAAC 2017)*, pages 3:1–3:13, 2017.
9. Jongmin Choi, Dongwoo Park, Hee-Kap Ahn. Bundling Two Simple Polygons to Minimize Their Convex Hull. *In Proc. 11th International Conference and Workshops on Algorithms and Computation (WALCOM 2017)*, pages 66–77, 2017.

Academic activities

Workshop

Korean Workshop on Computational Geometry *Obertrubach, Germany*
2019

Journal Reviews

reviewer, Journal of supercomputing(J. Supercomput) *2025*
reviewer, Theory of Computing Systems(TOCS) *2024*
reviewer, Computational Geometry: Theory and Applications(CGTA) *2023 2022 2020 2019*

Conference Reviews

sub reviewer, Symposium on Computational Geometry(SOCG) *2022 2020*
sub reviewer, Workshops on Algorithms and Data Structure(WADS) *2021*
sub reviewer, International Symposium on Algorithms and Computation(ISAAC) *2021*

Educational Activities

Teaching Assistants of AI Education Program for Business.

POSCO AI Expert. *Pohang, S.Korea*
PYTHON AND ALGORITHMS *2017 - 2022*
- Create algorithm materials for the course.

POSCO Youth AI · Big data Academy. *Pohang, S.Korea*
PYTHON AND ALGORITHMS *2022*
- Support by South Koreaś Ministry of Employment and Labor.

SK Hynix ML Champion. *Pohang, S.Korea*
ALGORITHMS *2019*

Samsung Electronics DS part ML Expert. *Pohang, S.Korea*
ALGORITHMS *2017*

Teaching Assistant.

CSED331 **Algorithms**, *Spring 2017 & 2018*
CSED312 **Operating System**, *Fall 2016*

Extracurricular Activity

PLUS (POSTECH Laboratory for UNIX Security) *Pohang, S.Korea*
Member & President at 2014 *May. 2012 - Feb. 2016*

POSCAT (POSTECH Computing Algorithm Team) *Pohang, S.Korea*
Member *Mar. 2012 - Feb. 2015*

Awards

2014 **6th place**, ACM ICPC Asia Daejeon Regional. *Daejeon, S.Korea*
2014 **Finalist**, Codegate CTF Finals *Seoul, S.Korea*
2012 **10th place**, ACM ICPC Asia Daejeon Regional. *Daejeon, S.Korea*