

Junyoung Park

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RESEARCH INTERESTS

I am broadly interested in data analysis that involves unique geometric structures necessitating rigorous treatment. My recent research focuses on distributional data analysis for applications to wearable device data. In addition, I have an interest in compositional data analysis for microbiome data and various dimension reduction methods.

PROFESSIONAL POSITIONS

Postdoctoral Research Fellow Department of Biostatistics, University of Michigan, MI, USA Supervisor: Irina Gaynanova	09/2024 –
BK21 Postdoctoral Research Fellow Natural Science Research Institute, KAIST, Daejeon, Korea Supervisor: Cheolwoo Park Funded by the BK21 project in Korea	03/2024 – 08/2024

EDUCATION

Ph.D. in Mathematical Sciences KAIST, Daejeon, Korea Thesis: "Kernel Methods for Compositional Data and Dimensionality Reduction" (Co)Advisors: Cheolwoo Park, Jeongyoun Ahn	03/2018 – 02/2024
B.S. in Mathematics Korea University, Seoul, Korea	03/2013 – 02/2018

EXPERIENCE

Research Assistant in Statistical Learning Under the supervision of Prof. Cheolwoo Park and Jeongyoun Ahn	KAIST 08/2021 – 02/2024
– Kernel methods, compositional data, dimension reduction, autoencoder clustering	
Technical Research Personnel For military duty in South Korea	KAIST 03/2020 – 02/2023
Research Assistant in Algebraic Geometry Under the supervision of Prof. Sijong Kwak	KAIST 09/2018 – 07/2021
– Projective algebraic geometry, syzygies, applied algebraic geometry	
University Financial Engineering Association (U.FE.A) Team leader	Seoul, Korea 03/2016 – 08/2017
– Led Master's-level financial engineering & mathematics studies	
– Stochastic modeling and hedge (pricing) theory of various equity, interest rate derivatives	

AWARDS AND SCHOLARSHIPS

- **Gallup Korea Best Ph.D. Dissertation Award**, Korean Statistical Society (KSS); prize: 3,000,000 (KRW) 2025
- **Presentation Award for Graduate Students**, 2nd place, Korean Statistical Society (KSS) 2022
- **The Outstanding Teaching Assistant Award**, Calculus II, KAIST Fall, 2020

- **University Students Contest of Mathematics**, Silver Awards, Korean Mathematical Society (KMS) 2016, 2017
- **Presidential Science Undergraduate Fellowship**, fully funded for 8 semesters 2013–2018
- **The Korean Mathematical Olympiad (KMO)** 2nd round of the middle school division, Gold Awards 2009

RESEARCH PAPERS

Preprints/Submitted:

5. **Park, J.**, Park, C., and Ahn, J. (2025+) “A geometry-preserving framework for sufficient dimension reduction of compositional data.” Preprint available on [arXiv:2509.05563](https://arxiv.org/abs/2509.05563).
4. **Park, J.**, Kok, N., and Gaynanova, I. (2025+) “Beyond fixed thresholds: optimizing summaries of wearable device data via piecewise linearization of quantile functions.” Preprint available on [arXiv:2501.11777](https://arxiv.org/abs/2501.11777).

Peer-reviewed publications:

3. **Park, J.**, Ahn, J., and Park, C. (2023), “Kernel Sufficient Dimension Reduction and Variable Selection for Compositional Data via Amalgamation.” *International Conference on Machine Learning* (ICML), pp. 27034-27047, PMLR
Link: <https://proceedings.mlr.press/v202/park23a.html>.
2. Kang, I., Choi, H., Yoon, Y.-J., **Park, J.**, Kwon, S.-S., and Park, C. (2023), “Frechet Distance-Based Cluster Analysis for Multi-Dimensional Functional Data.” *Statistics and Computing*, 33(4), 75.
Link: <https://doi.org/10.1007/s11222-023-10237-z>
1. **Park, J.**, Yoon, C., Park, C., and Ahn, J. (2022), “Kernel Methods for Radial Transformed Compositional Data with Many Zeros.” *International Conference on Machine Learning* (ICML), pp. 17458-17472, PMLR
Link: <https://proceedings.mlr.press/v162/park22d.html>.

In progress (expect to submit around the end of 2025):

- Fréchet regression of multivariate distributions (with Gaynanova, I.)
- Fast distributional distance computation for embedding distributions (with Shao, E. and Gaynanova, I.)

TALKS

- **2025 Joint Statistical Meetings** 08/2025
Music City Center, Nashville, TN, USA
– Title: Beyond fixed thresholds: optimizing summaries of wearable device data
- **2024 Joint Statistical Meetings** 08/2024
Oregon Convention Center, Portland, OR, USA
– Title: Interpretable dimension reduction for compositional data
- **2023 Winter Conference, the Korean Statistical Society** 12/2023
Sungshin Women’s University, Seoul, Korea
– Title: Interpretable composition-to-composition dimension reduction via conditional covariance operator
- **40th International Conference on Machine Learning (ICML)** (poster) 07/2023
Honolulu, HI, USA
– Title: Kernel sufficient dimension reduction and variable selection for compositional data via Amalgamation
- **2023 Summer Conference, the Korean Statistical Society** 06/2023
Pukyong National University, Busan, Korea
– Title: Kernel sufficient dimension reduction and variable selection for compositional data via Amalgamation
- **2022 Fall KAIST Math Graduate student Seminar** 10/2022
KAIST, Daejeon, Korea
– Title: Kernel methods for radial transformed compositional data with many zeros
- **39th International Conference on Machine Learning (ICML)** (spolight talk) 06/2022
Baltimore, MD, USA
– Title: Kernel methods for radial transformed compositional data with many zeros
– Presented also at 2022 Summer Conference, the Korean Statistical Society, Seoul (awarded, 2nd place)

TEACHING

- **Teaching Assistant** at KAIST (selected list)
 - Statistical Data Science Practice (DS516) Spring 2023
 - Probability and Statistics (MAS250) Fall 2021
 - Abstract Algebra I (MAS311) Spring 2021
 - Mathematical Statistics (MAS355) Fall 2019
 - Matrix Group Theory (MAS435) Spring 2019
 - Gave a guest lecture on connectedness of Lie groups (in English)
 - Abstract Algebra II (MAS312) Fall 2018
 - Gave several guest lectures throughout the semester

ACADEMIC SERVICES

- **Journal Refereeing**
 - Journal of Royal Statistical Society, Series B (1)
 - Annals of Applied Statistics (2)
 - Biometrics (3)
 - WIREs Computational Statistics (1)

COMPUTING SKILLS

- Python (for machine learning, statistics), R (for statistics), previous experiences with Matlab and C
- Optimization acceleration with deep learning frameworks: **TensorFlow** and **Pytorch**
- Linux environment and high-performance computing (HPC) cluster systems

LANGUAGES

- English
- Korean

HOBBIES

- Singing, better with playing guitar.
- Running, hiking, and climbing.