Junyoung Park

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Research Interests

I am generally interested in **interpretable data analysis** with special geometric structures or high dimensionality. As a mathematician, I place a lot of value in providing rigorous and interpretable methods.

During my Ph.D., I have been primarily working on **compositional data analysis**, including variable selection, representation learning, and sufficient dimension reduction via kernel methods. I am also interested in portfolio management in finance, which can also be viewed as compositional data.

Keywords: Compositional data analysis, Kernel methods, Dimensionality reduction, Non-Euclidean data

Education

Ph.D. candidate in Mathematical Sciences 2018–2024 (expected: Feb)
Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea
Advisors: Cheolwoo Park, Jeongyoun Ahn

B.S. in Mathematics 2013–2018
Korea University, Seoul, Korea

Publications

1. **Park, J.**, Yoon, C., Park, C., and Ahn, J. (2022), Kernel Methods for Radial Transformed Compositional Data with Many Zeros, Proceedings of the 39th International Conference on Machine Learning (**ICML**), 162: 17458 - 17472. https://proceedings.mlr.press/v162/park22d.html

2. Kang, I., Choi, H., Yoon, Y.-J., **Park, J.**, Park, C., and Kwon, S.-S. (2023), Frechet Distance-Based Cluster Analysis for Multi-Dimensional Functional Data, Accepted for publication in Statistics and Computing.

3. **Park, J.**, Ahn, J., and Park, C. (2023+), Kernel Sufficient Dimension Reduction and Variable Selection for Compositional Data, submitted to ICML 2023

Teaching

- **Teaching Assistant** at KAIST
  - *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*
    Delivered some lectures on behalf of the professor, ***in English***
  - *Abstract Algebra II (MAS312)* — *Fall 2018*
    Delivered almost all lectures on behalf of the professor

Experience

Ph.D. Candidiate in Algebraic Geometry — KAIST
Former advisor: Sijong Kwak — 2018–2021

Max Planck Institute for Mathematics in the Sciences — Leipzig, Germany
Ph.D. student attendee — Summer 2019

- Summer School on Randomness and Learning in Non-Linear Algebra

University Financial Engineering Association (U.FE.A) — Seoul, Korea
Team leader — 2016–2017

- Led Master's-level financial engineering studies
- Math mentor; provided helps to teammates who are unfamiliar with complex mathematical concepts
- Studied stochastic modeling and hedge (pricing) theory of various equity, interest rate derivatives. Example reference: Paul Wilmott on Quantitative Finance

Talks

- **2023 Summer Conference, the Korean Statistical Society**, Pukyong National University, Busan, Korea 2023
  Title: Kernel sufficient dimension reduction and variable selection for compositional data
- **2022 Fall KAIST Math Graduate student Seminar(KMGS)**, KAIST, Daejeon, Korea 2022
  Title: Kernel methods for radial transformed compositional data with many zeros
- **2022 Summer Conference, the Korean Statistical Society**, Seoul National University, Seoul, Korea 2022
  Title: Kernel methods for radial transformed compositional data with many zeros

Awards and Grants

- Presentation Award for Graduate Students, 2nd place, Korean Statistical Society (KSS) 2022
- Silver Awards in University Students Contest of Mathematics, Korean Mathematical Society (KMS) 2016, 2017
- Presidential Science Undergraduate Fellowship, fully funded for 8 semesters 2013–2018

Skills

- **Machine Learning:** Kernel methods, optimizations, parallel programming
- **Computer Language:** Python, Tensorflow, R
- **Mathematics:** Applied algebraic geometry

Languages

- **Korean** (native)
- **English** (fluent)