Junyoung Park

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Research Interests

I am generally interested in data analysis with unique geometric structures necessitating rigorous treatment. Much of my research focuses on **compositional data analysis**, including variable selection, dimension reduction, and predictive model development. I am also interested in the recent theory of kernel conditional mean embeddings, sufficient dimension reduction, and high-dimensional statistics.

Education

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

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

Experience

Research Assistant in Statistical Learning KAIST
Under the supervision of Prof. Cheolwoo Park and Jeongyoun Ahn 2021–2024

- Kernel methods, compositional data, dimensionality reduction, autoencoder clustering

Research Assistant in Algebraic Geometry KAIST
Under the supervision of Prof. Sijong Kwak 2018–2021

- Projective geometry, syzygies, applied algebraic geometry
- Extensive training in geometry, algebra, and analysis at the graduate level and beyond

Max Planck Institute for Mathematics in the Sciences Leipzig, Germany
Visiting research student Summer 2019

- Attended 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 & mathematics studies
- Studied stochastic modeling and hedge (pricing) theory of various equity, interest rate derivatives

Awards and Scholarships

- **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 middle school division, Gold Awards 2009

Publications

1. **Park, J.**, Ahn, J., and Park, C. (2023), Kernel Sufficient Dimension Reduction and Variable Selection for Compositional Data via Amalgamation, In *International Conference on Machine Learning* (ICML), pp. 27034-27047, PMLR (link).

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.

3. **Park, J.**, Yoon, C., Park, C., and Ahn, J. (2022), Kernel Methods for Radial Transformed Compositional Data with Many Zeros, In *International Conference on Machine Learning* (ICML), pp. 17458-17472, PMLR (link).

In progress:

1. Interpretable Composition-To-Composition Dimension Reduction via Conditional Covariance Operator (with Jeongyoun Ahn and Cheolwoo Park), partially appeared in my Ph.D. dissertation.

Talks

- **2023 Winter Conference, the Korean Statistical Society** 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)** (postered) 2023
  Honolulu, HI, USA
  – Title: Kernel sufficient dimension reduction and variable selection for compositional data via Amalgamation
- **2023 Summer Conference, the Korean Statistical Society** 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** 2022
  KAIST, Daejeon, Korea
  – Title: Kernel methods for radial transformed compositional data with many zeros
- **39th International Conference on Machine Learning (ICML)** (spolight talk) 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 lectures throughout the semester

Computing Skills

- Python (for machine learning, statistics), R (for statistics), previous experiences with Matlab and C.
- Acceleration of optimization: experience in leveraging `TensorFlow AutoGraph` in my research.
- Parallel programming in R: `foreach` package, `mclapply` function in Linux environment.

Languages

- Korean (native)
- English

Hobbies

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

References

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