Kisung You

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RESEARCH INTEREST

Geometric and topological machine learning for non-Euclidean data, large-scale data analysis, computational statistics and software development, applications to biomedical data (neuroimaging, electronic health record, genomic).

CURRENT POSITION

Postdoctoral Researcher
Department of Internal Medicine — July 2022 - current
Yale University, USA
- **Advisor:** Prof. Dennis Shung

Department of Genetics — September 2021 - May 2022
Yale University, USA
- **Advisor:** Prof. Smita Krishnaswamy

EDUCATION

Ph.D., Statistics — August 2016 - August 2021
Department of Applied and Computational Mathematics and Statistics
University of Notre Dame, USA
- **Advisor:** Prof. Lizhen Lin, Prof. Ick Hoon Jin
- **Thesis:** *Topics in Geometric and Topological Data Analysis*

M.S., Mathematics — August 2015
Department of Computational Science and Engineering
B.A., Business Administration — August 2013
B.S., Mathematics
Yonsei University, Seoul, South Korea

FELLOWSHIPS & AWARDS

- Outstanding Graduate Student Teaching Award — April 2019
  University of Notre Dame
- Marilyn Jane Navari Fellowship — 2017 - 2021
  University of Notre Dame
- Navari Fellowship — 2016 - 2017
  University of Notre Dame
- Brain Korea 21 Scholarship — 2013 - 2015
  National Research Foundation of Korea

PUBLICATIONS

(* for equal contributions; † for corresponding author)

[1] **K. You**† and D. Shung. (2022) Rdimtools : An R package for Dimension Reduction and Intrinsic Dimension Estimation. Accepted for publication. *Software Impacts*.

[2] **K. You**† and C. Suh. (2022) Parameter Estimation and Model-Based Clustering with Spherical Normal Distribution on the Unit Hypersphere. *Computational Statistics and Data Analysis*. **171**:107457.

[3] BS. Thomas, **K. You**, L. Lin, L-H. Lim, and S. Mukherjee. (2022). Learning Subspaces of Different Dimensions. *Journal of Computational and Graphical Statistics*. **31**(2): 337-350.

[4] **K. You*** and H-J. Park*. (2021). Re-visiting Riemannian geometry of symmetric positive definite matrices for the analysis of functional connectivity. *NeuroImage*. **225**:117464.

[5] H. Tak, **K. You**, S. K. Ghosh, B. Su, and J. Kelly. (2020). Data transforming augmentation for heteroscedastic models. *Journal of Computational and Graphical Statistics*. **29**(3): 659-667.

[6] J. H. Park, E-J. Kwak, **K. You**, Y-S. Jung, and H-D. Jung. (2019). Volume change pattern of decompression of mandibular odontogenic keratocyst. *Maxillofacial Plastic and Reconstructive Surgery*. **41**:2.

[7] Y.J. Cha, **K. You**, and W. Choi. (2016). Vision-based detection of loosened bolts using the Hough transforms and support vector machines. *Automation in Construction*. **71**(2): 181-188.

WORK IN PROGRESS

[i] K. Lee, **K. You**, and L. Lin. Bayesian Optimal Two-sample Tests for High-dimensional Gaussian Populations. Submitted to *Bayesian Analysis*.

[ii] B. Yu and **K. You**. Shape-Preserving Dimensionality Reduction : An Algorithm and Measures of Topological Equivalence. Submitted to *IEEE Transactions on Pattern Analysis and Machine Intelligence*.

[iii] **K. You**, and H-J. Park. Geometric Learning of Functional Connectivity on the Correlation Manifold. Submitted to *Scientific Reports*.

[iv] **K. You**. On the spherical Laplace distribution.

[v] **K. You**. Fréchet median of Gaussian measures under Wasserstein geometry. In preparation.

[vi] **K. You**. Robust and Scalable Learning of Gaussian Mixture Models. In preparation.

PREPRINTS

[i] D. Bao, **K. You**, and L. Lin. Network Distance Based on Laplacian Flows on Graphs. *arXiv:1810.02906*.

PRESENTATIONS

(▶ Poster presentation; ▷ Contributed talk.)

▷ Robust and Scalable Learning of Gaussian Mixture Models. Korean Statistical Society Conference. *Seoul, South Korea*, November 2021.

▶ MNET 2.0: Big Graphical Mining of Multimodal Brain Networks. NetSci 2016. *Seoul, South Korea*, June 2016.

▶ Reusability of deep neural network for human functional networks. NetSci 2016. *Seoul, South Korea*, June 2016.

▶ Low-dimensional representation of human brain networks with modularity-based proximity of large-scale functional graphs. NetSci 2016. *Seoul, South Korea*, June 2016.

▷ Convergence of Empirical Intensity CDF and Texture Classification. KSIAM 2015 Spring Conference. *Suwon, South Korea*, May 2015

PROFESSIONAL EXPERIENCE

Researcher October 2015 – July 2016
Yonsei Epilepsy Research Center, Seoul, South Korea

Research Associate August 2015 – September 2015
LG Electronics Advanced Research Institute, Seoul, South Korea

Assistant Project Manager July 2012 – June 2013
Korea International Cooperation Agency, Seoul, South Korea

SOFTWARE

(• in R on CRAN; more available on GitHub)

- ADMM Algorithms using Alternating Direction Method of Multipliers.
- CovTools Geometrical and Statistical Tools for Covariance Analysis.
- filling Matrix Completion, Imputation, and Inpainting Methods.
- graphon A collection of graphon estimation methods.
- maotai Tools for Matrix Algebra, Optimization and Inference.
- mclustcomp Measures for comparing partitions of sets.
- NetworkDistance Distance Measures for Networks.
- Rdimtools Dimension reduction and estimation methods.
- RiemBase Functions and C++ Header Files for Computation on Manifolds.
- Riemann Learning with Data on Riemannian Manifolds.
- Rlinsolve Fast Iterative solvers for (sparse) linear system of equations.
- ROptSpace Matrix Completion from a partially observed matrix.
- SBmedian Scalable Bayes with Median of Subset Posteriors.
- SHT Statistical Hypothesis Testing Toolbox.
- T4cluster Tools for Cluster Analysis.
- T4transport Tools for Computational Optimal Transport.
- tvR Total Variation Regularization for Signals and Images.
- Zseq Integer Sequence Generator.

TEACHING EXPERIENCE

Instructor Fall 2017 – Spring 2020
University of Notre Dame, USA

- Statistical Methods and Data Analysis Lab (Accumlative : $4.78 \pm 0.31/5$)

Teaching Assistant Fall 2016 – Fall 2020
University of Notre Dame, USA

- Mathematical Statistics (Fall 2020)
- Systems and Technology: R (Summer 2017)
- Probability and Statistics for Data Science (Summer 2017)
- Statistics for the Life Sciences (Spring 2017)
- Statistics for Business and Economics I (Fall 2016)

SKILLS

- *Language* Korean, English.
- *Software* R, Python, C/C++, MATLAB.
- *Others* Society of Actuaries Exam P, FM.

REFERENCES

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Dr. Hyungsuk Tak
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