

YOUNG-GEUN KIM

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<https://kyg0910.github.io/>

<https://scholar.google.com/citations?user=HVqiptEAAAAJ>

RESEARCH INTERESTS

My research interests revolve around developing innovative data science tools and promoting their dissemination on biomedical data. Research topics include, but are not limited to:

- Deep generative models for multi-modal biomedical data (e.g., neuroimaging and multi-omics)
- Deep learning for identifying biomarkers associated with mental illness
- Reinforcement learning-based health care

PROFESSIONAL APPOINTMENTS

Assistant Professor

Aug. 2024 - Present

Department of Statistics and Probability, Michigan State University

EDUCATION & TRAINING

Adjunct Associate Research Scientist

Jul. 2021 - Aug. 2024

Department of Biostatistics, Columbia University

Mentor: Ying Liu, Ph.D.

Postdoctoral Researcher

Jul. 2021 - Aug. 2024

Department of Psychiatry, Columbia University

Mental Health Data Science, New York State Psychiatric Institute

Mentor: Ying Liu, Ph.D.

Postdoctoral Researcher

Mar. 2021 - Jun. 2021

Department of Statistics, Seoul National University

Mentor: Myunghee Cho Paik, Ph.D.

Seoul National University

Mar. 2015 - Feb. 2021

Ph.D. in Statistics

Graduated with the Best Dissertation Award

Advisor: Myunghee Cho Paik, Ph.D.

Dissertation: Statistical distance of conditional distributions and its applications

Seoul National University

Mar. 2010 - Feb. 2015

Triple Major

Graduated with Honors (Cum Laude)

B.S. in Industrial Engineering

B.S. in Statistics

B.S. in Mathematical Sciences

HONORS & AWARDS

Career Development Award

Dec. 2023

Korean International Statistical Society

Outstanding Reviewer Award

Jul. 2022

Thirty-ninth International Conference on Machine Learning

Best Dissertation Award

Feb. 2021

College of Natural Sciences, Seoul National University

Seoul National University Innovation Program Scholarship

Mar. 2017 - Feb. 2018

Seoul National University

* Awarded to the Ph.D. student with the highest GPA in the department.

1st Prize, Student Paper Competition

June 2017

Korean Statistical Society

PUBLICATIONS & PREPRINTS

*: First author; ‡: Corresponding author

Journal

1. Kim, S.* , **Kim, Y.-G.**, and Wang, Y.‡ (2024). Temporal generative models for learning heterogeneous group dynamics of ecological momentary data. *Biometrics*. [\[Paper\]](#) [\[Code\]](#)
- **Top 12** Statistics and Probability journal (H-index: 149; upper 4.5%)
2. **Kim, Y.-G.***, Ravid, O.* , Zheng, X., Kim, Y., Neria, Y., Lee, S., He, X.‡, and Zhu, X.‡ (2024). Explaining deep learning-based representations of resting state functional connectivity data: focusing on interpreting nonlinear patterns in autism spectrum disorder. *Frontiers in Psychiatry, section Computational Psychiatry*. [\[Paper\]](#) [\[Code\]](#)
- **Top 86** Psychiatry and Mental Health journal (H-index: 114; upper 14.9%)
3. **Kim, Y.-G.***, Lee, K., and Paik, M.C.‡ (2022). Conditional Wasserstein generator. *IEEE Transactions on Pattern Analysis and Machine Intelligence*. [\[Paper\]](#) [\[Code\]](#)
- **Top 1** Applied Mathematics journal (H-index: 417; upper 0.2%)
4. **Kim, Y.-G.***, Kwon, Y., and Paik, M.C.‡ (2019). Valid oversampling schemes to handle imbalance. *Pattern Recognition Letters*, 125 (1): 661-667. [\[Paper\]](#) [\[Code\]](#)
- **Top 13** AI journal (H-index: 181; upper 4.0%)

Peer-reviewed Conference

1. **Kim, Y.-G.***, Hu, M.-C., Nunes, E. V., Luo, S. X.‡, and Liu, Y.‡ (2025). Optimizing contingency management with reinforcement learning. *Accepted at IEEE International Conference on Healthcare Informatics (selected as a long presentation)*. [\[PreliminaryVersion\]](#)[\[Code\]](#)
- **Top 10** Medical Informatics conference (Impact Score: 0.90)
2. **Kim, Y.-G.***, Liu, Y.‡, and Wei, X. (2023). Covariate-informed representation learning to prevent posterior collapse of iVAE. *Proceedings of the Twenty Third International Conference on Artificial Intelligence and Statistics (AISTATS 2023)*. [\[Paper\]](#) [\[Code\]](#)
- **Top 6** AI conference (H5-index: 100)
3. Kim, M.* , **Kim, Y.-G.**, Kim, D., Kim, Y., and Paik, M.C.‡ (2021). Kernel-convoluted deep neural networks with data augmentation. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI 2021)*. [\[Paper\]](#) [\[Code\]](#)
- **Top 4** AI conference (H5-index: 220)
4. **Kim, Y.-G.***, Kwon, Y., Chang, H., and Paik, M.C.‡ (2020). Lipschitz continuous autoencoders in application to anomaly detection. *Proceedings of the Twenty Third International Conference on Artificial Intelligence and Statistics (AISTATS 2020)*. [\[Paper\]](#) [\[Code\]](#)
- **Top 6** AI conference (H5-index: 100)

Patents

1. Paik, M.C.[‡], **Kim, Y.-G.**, and Lee, K. (2024). Method and apparatus for conditional data generation using conditional Wasserstein generator. *KR Patent 102734936B1*. [\[Info\]](#)
2. Paik, M.C.[‡], **Kim, Y.-G.**, and Chang, H. (2021). Learning method and learning device for high-dimension unsupervised anomaly detection using kernalized Wasserstein autoencoder to lessen too many computations of Christophel function, and testing method and testing device using the same. *KR Patent 102202842B1*. [\[Info\]](#)

Preprints

1. **Kim, Y.-G.**^{*}, Lee, K., Choi, Y., Won, J.-H., and Paik, M.C.[‡] (2023). Wasserstein geodesic generator for conditional distributions (under *Major Revision* at Journal of Machine Learning Research). [\[ArXiv\]](#)[\[Code\]](#)
2. Zheng, X.^{*}, Ravid, O., Barry, R. A.J., Kim, Y., Wang, Q., **Kim, Y.-G.**, Zhu, X.[‡] and He, X.[‡] (2024). Denoising Variational Autoencoder as a Feature Reduction Pipeline for the diagnosis of Autism based on Resting-state fMRI. [\[ArXiv\]](#)

Work in Progress

1. **Kim, Y.-G.**^{*‡} and Liu, Y. Mid-VAE: Multi-modal, Identifiable, and Disentangled Representation Learning for Children’s Structural Brain Imaging. Work in progress
- Preliminary results were presented at ABCD AIIM conference.
2. Yang, B.^{*}, **Kim, Y.-G.**, and Wang, Y.[‡] Representation learning for optimizing individualized treatment decisions. Work in progress.
- This work was selected as the Runner-up in the student paper competition for the Statistics in Imaging Section of the ASA in 2025.
3. Yu, W.^{*}, Qu, G., **Kim, Y.-G.**, Xu, L., and and Zhang, A.[‡] (2025). A Novel GNN Framework Integrating Neuroimaging and Behavioral Information to Understand Adolescent Psychiatric Disorders (submitted to MIDL 2025).

GRANTS & FUNDING

I submitted the following grant proposals as a PI.

- **Statistical Understanding of Adversarial Training in Neural Networks** *Jun. 2025 - May. 2028*
(If accepted)
Under review at the NSF DMS PD 18-1269 (Role: **Co-PI**; **PI**: Dr. Yue Xing at Michigan State University)
- **Statistical method for neural mechanism mediating and moderating cognitive system in Alzheimer’s disease and aging research** *Dec. 2025 - Dec. 2030*
(If accepted)
Under review at the NIH NIA PAR-25-332 (R01) (Role: **Sub-PI**; **PI**: Dr. Seonjoo Lee at Columbia University). It is an inter-university project, including Columbia University, Michigan State University, University of Texas at Arlington, and the University of Michigan.
- **Foundations of Deep Bayesian Manifold Learning with Applications to Complex and Large-scale Data**
A two-pager project narrative is under review at the NSF EARly-concept Grants for Exploratory Research (EAGER) (Role: **Co-PI**; **PI**: Dr. Shrijita Bhattacharya at Michigan State University).
- **Development of reinforcement learning-based tools for evaluating contingency management intervention in substance use disorder treatments** *Under Preparation*

It was submitted to the NIH NIDA K99/R00, a track for postdoctoral fellows (Role: **PI**), and I am currently revising the proposal to target tracks for faculty.

I participated the following projects as a **research scientist**.

- **A data science framework for empirically evaluating and deriving reproducible and transferrable RDoC constructs in youth (R01)**
Funded by NIH NIMH

Jul. 2021 - Aug. 2024
- **Deep learning with incomplete and sequential data: Application to biomedical data**
Funded by National Research Foundation of Korea

Mar. 2020 - Jun. 2021
- **Development of low-yield trackers via causal inference**
Funded by SK Telecom

May 2019 - Nov. 2019
- **Statistical approaches to deep learning: New methods for convolutional neural networks in application to medical imaging data**
Funded by National Research Foundation of Korea

Mar. 2017 - Feb. 2020
- **Deep Learning for the CT based Acute Cerebral Infarction Classification and Lesion Segmentation**
Collaborated with Seoul National University Bundang Hospital
Funded by National Research Foundation of Korea

July 2016 - May 2019
- **New Robust Methods for Missing or Censored Covariates**
Funded by National Research Foundation of Korea

Mar. 2016 - Nov. 2016

SELECTED TALKS

Invited Talks

- (Submitted to 2025 IISA) **Kim, Y.-G.**, Lee, K., Choi, Y., Won, J.-H., and Paik, M.C. (2025). Wasserstein geodesic generator for conditional distributions.
- **Kim, Y.-G.**, Luo, S. X., Brandt, L., Cheung, K., Nunes, E. V., Roll, J., and Liu, Y. (2024). Optimizing contingency management interventions in substance use disorder treatment with reinforcement learning. *The Joint Statistical Meetings (JSM), Portland, OR.*
- **Kim, Y.-G.** and Liu, Y. (2024). Deep Identifiable Generative Models for Multi-Modal Data Analysis. *The 2024 International Chinese Statistical Association (ICSA) Applied Statistics Symposium, Nashville, TN.*
- **Kim, Y.-G.**, Kwon, Y., Chang, H., and Paik, M.C. (2019). Lipschitz continuous autoencoders in application to anomaly detection. *IMS-China International Conference on Statistics and Probability, Dalian, China.*

Contributed Talks

- **Kim, Y.-G.**, Liu, Y., and Wei, X. (2023). Covariate-informed representation learning to prevent posterior collapse of iVAE. *The Twenty Third International Conference on Artificial Intelligence and Statistics (AISTATS 2023), Palau de Congressos, Valencia, Spain.*[†]
- **Kim, Y.-G.**, Kwon, Y., Chang, H., and Paik, M.C. (2020). Lipschitz continuous autoencoders in application to anomaly detection. *The 23rd International Conference on Artificial Intelligence and Statistics (AISTATS 2020), Virtual conference due to COVID-19.*

- **Kim, Y.-G.** and Liu, Y. (2024). Explaining Nonlinear Patterns in Children’s Structural MRI with Multi-modal Identifiable VAE. *The ABCD Insights & Innovations Meeting, MD.*[†]
- **Kim, Y.-G.**, Liu, Y., Brandt, L., Cheung, K., Nunes, E. V., Roll, J., and Luo, S. X. (2023). Optimizing contingency management in substance use disorder treatment using off-policy policy evaluation. *Eastern North American Region (ENAR) 2023 Spring meeting.*

[†] indicates a poster presentation.

TEACHING EXPERIENCE

Instructor

- **STT 997: Advanced Topics in Statistics** [\[CourseMaterial\]](#) *Spring 2025*
Michigan State University
- Graduate-level course on recent topics in deep generative models and their applications.
- **Statistics Lab** *Fall 2015*
Seoul National University
- Freshman course introducing R programming.

Guest Lecturer

- (Scheduled) **Statistical Practice and Research for Interdisciplinary Sciences (SPRIS)** *Spring 2025*
Columbia University
- Graduate-level course on interdisciplinary research topics in Biostatistics.
- Will give a lecture “Variational Autoencoders and Their Applications to Multi-modal Data Analysis.”
- **STT 990: Statistics & Probability** *Fall 2024*
Michigan State University
- Graduate-level seminar course.
- Gave the lecture “Deep Generative Model: A Statistical Perspective.”
- **Statistical Practice and Research for Interdisciplinary Sciences (SPRIS)** *Spring 2024*
Columbia University
- Graduate-level course on interdisciplinary research topics in Biostatistics.
- Gave the lecture “Recent Topics on Conditional Generative Models.”
- **Deep Learning: A Statistical Perspective** *Fall 2021*
Seoul National University
- Graduate-level course on deep learning.
- Gave the lecture “Conditional Image Synthesis and Its Applications” in English.

MENTORSHIP EXPERIENCE

Co-mentoring Graduate Students at Columbia University

- Bin Yang, Ph.D. Candidate, Department of Biostatistics *April. 2024 - Present*
- Conducted regular weekly meetings with Dr. Yuanjia Wang.
- Provided mentorship on the following work:
Yang, B., **Kim, Y.-G.**, and Wang, Y. Representation learning for optimizing individualized treatment decisions. Work in progress.
- This work was selected as the Runner-up in the student paper competition for the Statistics in Imaging Section of the ASA in 2025.

- Soohyun Kim, Ph.D., Department of Biostatistics Mar. 2022 - Sep. 2024
 - Conducted regular weekly meetings with Dr. Yuanjia Wang.
 - Provided mentorship on the doctoral dissertation and the following paper:
 Kim, S., **Kim, Y.-G.**, and Wang, Y. (2024). Temporal generative models for learning heterogeneous group dynamics of ecological momentary data. *Biometrics*. [\[Paper\]](#) [\[Code\]](#)
- Zekai Jin, Master Student, Department of Biostatistics Dec. 2022 - Oct. 2023
 - Conducted regular bi-weekly meetings with Dr. Seonjoo Lee.
 - Provided mentorship on deep learning-based EEG denoising methods.

OTHER PROFESSIONAL ACTIVITIES

Conference Organizer

- (Submitted) Invited Session at 2025 IISA (role: **Speaker**)
- Invited Session at JSM 2024 (role: **Organizer & Speaker**); Title: Reliable and Cost-effective Mental Health Care with Reinforcement Learning [\[Info\]](#)
- Invited Session at 2024 ICSA (role: **Speaker**); Title: Recent Advances in Precision Medicine and Adaptive Experiments [\[Info\]](#)
- Invited Session at ENAR 2023 (role: **Chair**); Title: Advanced Methods for Analyzing Large-Scale Neuroimaging Data from Nationwide Consortia for Mental Health Research [\[Info\]](#)
- Oral Presentation Session at ICML 2022 (role: **Chair**); Title: Theory [\[Info\]](#)

Reviewer (Journal)

- Expert Systems with Applications (42 submissions)
- JAMA Psychiatry (2 submissions)
- Biostatistics (1 submission)
- Statistics and Data Science in Imaging (2 submissions)
- International Journal of Computer Assisted Radiology and Surgery (3 submissions)
- Journal of the Korean Statistical Society (2 submissions)

Reviewer (Conference)

- International Conference on Machine Learning 2022
- International Conference on Artificial Intelligence and Statistics 2022 and 2023