

## Hyunseok Seung

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## Professional Appointments

2025 – Present    **Postdoctoral Research Associate**, *Department of Statistics, University of Wisconsin-Madison, Madison, WI*  
Advisor: [Matthias Katzfuss](#)

## Education

2019 – 2025    **Ph.D.** in Statistics, *University of Georgia, Athens, GA*  
Advisors: [Jaewoo Lee](#) and [Yuan Ke](#)  
Dissertation: *Scalable and Efficient Learning: Algorithmic Advances for Time Series and Deep Neural Models*

2016 – 2018    **M.A.** in Applied Statistics, *Yonsei University, Seoul, South Korea*  
Advisor: [Sangun Park](#)  
Thesis: *Modified Likelihood Ratio Tests for Extreme Value Distributions*

2008 – 2016    **B.A.** in Applied Statistics, *Yonsei University, Seoul, South Korea*

## Research Experience

2025 – Present    **Postdoctoral Researcher**, *Department of Statistics, University of Wisconsin – Madison*  
– **Hyperspectral Foundation Modeling** (advised by [Matthias Katzfuss](#) and [Sunduz Keles](#))

- Pre-training vision transformer foundation models on hyperspectral data, followed by fine-tuning for downstream trait prediction. Conformal prediction to quantify uncertainty.

– **Bayesian Optimization** (advised by [Matthias Katzfuss](#))

- Developing a scalable Bayesian optimization method.

2022 – 2025    **Research Assistant**, *School of Computing, University of Georgia*  
– **Deep Learning Optimization** (advised by [Jaewoo Lee](#))

- Developed a curvature-aware zeroth-order optimization method for fine-tuning LLMs, achieving faster convergence and higher test accuracy than state-of-the-art methods, while cutting memory usage by up to 27% compared to MeZO-Adam.
- Developed scalable second-order optimization methods using activation covariance, improving test accuracy by 3.6% on vision transformers compared to AdamW.

2023 – 2024    **Research Assistant**, *Department of Educational Psychology, University of Georgia*

– **Topic Modeling** (advised by [Shiyu Wang](#))

- Analyzed video and text data using automatic speech recognition and topic modeling, collaborating with researchers in mathematics education and psychology.

2021 – 2023      **Research Assistant**, *Department of Statistics, University of Georgia*

– **Time Series Forecasting**, (advised by [Yuan Ke](#))

- Developed hybrid COVID-19 mortality forecasting models. Utilized online autocovariance change point detection to boost model accuracy by 6% and reduce training time by 99% compared to standard rolling-window cross validation.

2018              **Associate Researcher**, *SK hynix Inc.*, South Korea

– **Wafer Failure Early Detection System** (advised by [Sangun Park](#))

- Streamlined semiconductor production by identifying key predictors of wafer failure, using statistical models for high-dimensional fabrication data.

## Publications

### Peer-reviewed Conference Proceedings

- C1. **Hyunseok Seung**, Lee, J. & Ko, H. *Low-Rank Curvature for Zeroth-Order Optimization in LLM Fine-Tuning* in *Proceedings of the AAAI Conference on Artificial Intelligence* (2026).
- C2. **Hyunseok Seung**, Lee, J. & Ko, H. *MAC: An Efficient Gradient Preconditioning using Mean Activation Approximated Curvature* in *IEEE International Conference on Data Mining (ICDM)* (2025).
- C3. **Hyunseok Seung**, Lee, J. & Ko, H. *An Adaptive Method Stabilizing Activations for Enhanced Generalization* in *IEEE International Conference on Data Mining Workshop (ICDMW)* (2024).
- C4. **Hyunseok Seung**, Lee, J. & Ko, H. *NysAct: A Scalable Preconditioned Gradient Descent using Nystrom Approximation* in *IEEE International Conference on Big Data* (2024).

### Journal Articles

- J1. **Hyunseok Seung** & Park, S. *Modified Likelihood Ratio Tests for Extreme Value Distributions.* *Communications in Statistics - Theory and Methods* **52**, 5742–5751 (2023).

### Manuscripts Submitted

- W1. **Hyunseok Seung**, Han, K., Shen, Y. & Ke, Y. *Enhancing COVID-19 Mortality Prediction with Online Autocovariance Change Points Detection.*

## Presentations

### Oral

- T1. *An Efficient Gradient Preconditioning using Mean Activation Approximated Curvature* 2025 IEEE International Conference on Data Mining (Washington, DC, USA). Nov. 2025.
- T2. *A Scalable Preconditioned Gradient Descent using Nystrom Approximation* 2024 IEEE International Conference on Big Data (Washington, DC, USA). Dec. 2024.

## Posters

- P1. *A Scalable Preconditioned Gradient Descent using Nystrom Approximation* 2025 AI Research Day, Institute for Artificial Intelligence (Athens, GA, USA). Apr. 2025.
- P2. *An Adaptive Method Stabilizing Activations for Enhanced Generalization* 2024 AI Research Day, Institute for Artificial Intelligence (Athens, GA, USA). Apr. 2024.

## Teaching

### University of Georgia

2019 – 2023	<b>Teaching Assistant</b>	
	– Design Analysis Experiments, STAT6430	Spring 2023
	– Statistical Methods for Researchers, STAT6315	Spring 2023
	– Advanced Statistical Applications and Computing, STAT8330	Fall 2022
	– Applied Linear Models, STAT6420	Fall 2022
	– Applied Regression Analysis, STAT4230	Spring 2022
	– Program and Data Lit using R, STAT2360	Fall 2021
	– Statistical Methods, STAT4210	Spring 2021
	– Statistical Inference Bioinformatics, STAT8440	Fall 2020
	– Intro to Statistical Methods, STAT6210	Fall 2020
	– Intro to Statistics for Life Science, STAT3110	Summer 2020
	– Intro to Probability for Life Science, STAT3120	Spring 2020
	– Statistical Methods, STAT6210	Fall 2019

### Yonsei University

2018	<b>Lecturer</b>	
	– Introduction to Statistics, STAT1001	Fall 2018
2017 – 2018	<b>Teaching Assistant</b>	
	– Introduction to Statistics, STAT1001	Spring 2018
	– Introduction to Statistics, STAT1001	Fall 2017
	– Introduction to Statistics, STAT1001	Spring 2017

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