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

2025 – Present　**Postdoctoral Researcher**, *Department of Statistics*, *University of Wisconsin – Madison*
– **Bayesian Optimization** (advised by Matthias Katzfuss)

- Developing a scalable Bayesian optimization method.

– **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.

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

Yonsei University

2018	**Lecturer**	
	– STAT1001 Introduction to Statistics	Fall 2018
2017 – 2018	**Teaching Assistant**	
	– STAT1001 Introduction to Statistics	Spring 2018
	– STAT1001 Introduction to Statistics	Fall 2017
	– STAT1001 Introduction to Statistics	Spring 2017

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Last updated: December 11, 2025