

**Hyunseok Seung**  
Morgridge Hall 4516  
1205 University Avenue  
Madison, WI 53706  
Email: [hseung2@wisc.edu](mailto:hseung2@wisc.edu) | Website: [hseung88.github.io](https://hseung88.github.io)

## 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*
- W2. **Hyunseok Seung**, Lee, J. & Ko, H. *Mean Activation Curvature for Scalable Second-Order Optimization in Deep Networks*

## 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. *Low-Rank Curvature for Zeroth-Order Optimization in LLM Fine-Tuning* AAAI Conference on Artificial Intelligence (Singapore). Jan. 2026.
- P2. *A Scalable Preconditioned Gradient Descent using Nystrom Approximation* AI Research Day, Institute for Artificial Intelligence (Athens, GA, USA). Apr. 2025.
- P3. *An Adaptive Method Stabilizing Activations for Enhanced Generalization* AI Research Day, Institute for Artificial Intelligence (Athens, GA, USA). Apr. 2024.

## Teaching

### University of Georgia

2019 – 2023	<b>Teaching Assistant</b>		
	– 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	<b>Lecturer</b>		
	– STAT1001 Introduction to Statistics		Fall 2018
2017 – 2018	<b>Teaching Assistant</b>		
	– STAT1001 Introduction to Statistics		Spring 2018
	– STAT1001 Introduction to Statistics		Fall 2017
	– STAT1001 Introduction to Statistics		Spring 2017

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