

Naoki Sato

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RESEARCH INTERESTS

Optimization for Machine Learning, Graduated Optimization, Deep Equilibrium Models

EDUCATION

Meiji University Kanagawa, Japan
Ph.D. Student in Computer Science Apr. 2025 – Present
• **Supervisor:** Prof. Hideaki Iiduka

Meiji University Kanagawa, Japan
M.S. in Computer Science Apr. 2023 – Mar. 2025
• **Supervisor:** Prof. Hideaki Iiduka
• **Thesis:** Implicit Graduated Optimization with Noise in Stochastic Gradient Descent

Meiji University Kanagawa, Japan
B.S. in Computer Science Apr. 2019 – Mar. 2023
• **Advisor:** Prof. Hideaki Iiduka
• **Thesis:** Using Constant Learning Rate of Two Time-Scale Update Rule for Training Generative Adversarial Networks

PUBLICATIONS

Conference Proceedings

1. **Vanilla SGD with Momentum Survives Heavy-Tailed Noise: Convergence Analysis without Gradient Clipping or Normalization**
Ryusei Yamada, Naoki Sato, Hideaki Iiduka
Conference on Uncertainty in Artificial Intelligence (UAI), 2026
2. **Lipschitz Multiscale Deep Equilibrium Models: A Theoretically Guaranteed and Accelerated Approach**
Naoki Sato, Hideaki Iiduka
International Conference on Artificial Intelligence and Statistics (AISTATS), 2026
3. **Explicit and Implicit Graduated Optimization in Deep Neural Networks**
Naoki Sato, Hideaki Iiduka
AAAI Conference on Artificial Intelligence (AAAI), 2025
4. **Existence and Estimation of Critical Batch Size for Training Generative Adversarial Networks with Two Time-Scale Update Rule**
Naoki Sato, Hideaki Iiduka
International Conference on Machine Learning (ICML), 2023

Journal Articles

5. **Scaled Conjugate Gradient Method for Nonconvex Optimization in Deep Neural Networks**
Naoki Sato, Koshiro Izumi, Hideaki Iiduka
Journal of Machine Learning Research (JMLR), 2024

Extended Abstract

6. **Theoretical Analysis of Two Time-Scale Update Rule for Training GANs**
Naoki Sato, Hideaki Iiduka
The 10th International Congress on Industrial and Applied Mathematics (ICIAM), 2023

HONORS AND AWARDS

- **JSPS Research Fellowship for Young Scientists (DC2)** Apr. 2026 – Mar. 2028
- **Google Conference Scholarship, \$1500** (travel grants for AAAI-25) Feb. 2025