Kakei Yamamoto

E-mail: kakei@mit.edu

EDUCATION

Massachusetts Institute of Technology (MIT) Cambridge, MA
Ph.D. in Computer Science. GPA: 4.9/5.0 *September 2023 – May 2028 expected*
M.S. in Computer Science. *September 2023 – Feb 2026*
Advisor: Prof. Martin Wainwright

The University of Tokyo (UTokyo) Tokyo, Japan
B.Eng. in Applied Mathematical & Computer Science. Major GPA: 3.93/4.0 *April 2019 – March 2023*
Advisor: Prof. Taiji Suzuki

Summary:

MIT Ph.D. student in Computer Science advised by Martin Wainwright, working on distillation, transfer learning, generative AI, and robust inference under distribution shift. Published at ICML and ICLR, with current research on efficient model distillation and domain adaptation. Available for a 4-month internship in Tokyo in Summer 2026.

Research Interests:

Distillation, Generative AI, Test-time / Efficient Inference, Transfer Learning, Open-ended Learning, Optimization

EXPERIENCE

Laboratory for Information & Decision Systems, MIT Cambridge, MA
Ph.D. Research Assistant (Advisor: Prof. Martin Wainwright) *September 2023 –*

- **Implicit Importance Weighting:** Developed a one-step algorithm for unsupervised domain adaptation that avoids unstable density-ratio estimation, with theoretical guarantees connecting it to relative density reweighting under distribution shift.
- **Residual-as-Teacher:** Proposed a functional gradient descent framework for model distillation. Demonstrated that learning from residuals outperforms standard pseudo-labeling in high-dimensional covariate shift settings.
- Work spans both theory and algorithm design for efficient inference, transfer learning, and robust learning under shift.

Center for Advanced Intelligence Project (AIP), Riken Tokyo, Japan
Pre-doctoral Researcher, Deep Learning Theory Team *April 2022 – August 2023*

- Developed a provable optimization algorithm for mean-field neural networks in game-theoretic and multi-agent reinforcement learning settings, together with theoretical guarantees for its dynamics.

Statistical Learning Theory Lab, UTokyo Tokyo, Japan
Undergraduate Researcher *September 2022 – March 2023*

- Established global optimality and linear convergence guarantees for neural actor-critic methods with feature learning.

International Research Center of Neurointelligence (IRCN), UTokyo Tokyo, Japan
Student Researcher *January 2022 – August 2023*

- Studied multi-spike spiking neural networks based on spike timing, clarifying the effects of refractory periods and synaptic leakage on learning performance.
- Demonstrated supervised learning via timing-based backpropagation in feedforward and recurrent multi-spike SNNs.

Aihara Moonshot Project, JST & the Cabinet Office Tokyo, Japan
Project Member *January 2022 – August 2023*

- Contributed to a national-scale research project on dynamical network biomarkers for disease prediction and causal analysis in organ-organ interactions.

Numerical Analysis Lab, UTokyo Tokyo, Japan
Undergraduate Researcher *August 2021 – September 2022*

- Improved the computational efficiency of the double exponential formula for the gamma function using shift invariance, supported by both theoretical and empirical analysis.

SELECTED PUBLICATIONS

- **Kakei Yamamoto**, and Martin J. Wainwright, "Implicit Importance Weighting for Unsupervised Domain Adaptation" (to appear)
- **Kakei Yamamoto**, and Martin J. Wainwright. "Residual-as-Teacher: Mitigating Bias Propagation in Student--Teacher Estimation." *arXiv preprint arXiv:2603.25466*, 2026 (under review at Annals of Statistics.)

- **Kakei Yamamoto**, Kazusato Oko, Zhuoran Yang, and Taiji Suzuki, “Mean Field Langevin Actor-Critic: Faster Convergence and Global Optimality beyond Lazy Learning,” Proceedings of the 41st International Conference on Machine Learning (**ICML**), 2025.
- Juno Kim, **Kakei Yamamoto**, Kazusato Oko, Zhuoran Yang, and Taiji Suzuki, “Symmetric mean-field Langevin dynamics for distributional minimax problems,” The Twelfth International Conference on Learning Representations (**ICLR Spotlight top 6%**), 2024.
- **Kakei Yamamoto**, Yusuke Sakemi, and Kazuyuki Aihara, “Can Timing-Based Backpropagation Overcome Single-Spike Restrictions in Spiking Neural Networks?” International Joint Conference on Neural Networks (IJCNN), 2024.
- **Kakei Yamamoto**, Ken’ichiro Tanaka, and Takayasu Matsuo, “Proposal of a Numerical Method for Calculating the Gamma Function by the Double Exponential Formula,” *JSIAM Annual Meeting*, 2022.

AWARDS

- **Takenaka Scholarship Foundation (2023 - 2028)**
  Awarded to the best students (around 3) from Japan per year. Covers the tuition and living fee.
- **Kiyo Sakaguchi Scholarship, The Prudential Life Insurance Company, Ltd. (2023 - 2027)**
  Awarded to outstanding students majoring in mathematics (no more than 2) from Japan per year. Covers the tuition.

SKILLS

- **Languages:** English – Fluent (IELTS: 7.0) and Japanese – Native
- **Programming:** Python (especially using PyTorch on research), LaTeX, Swift, C++, Java, MATLAB, TypeScript, and R
- **Additional:** Theoretical ML, algorithm design, empirical research prototyping

LEADERSHIP

- President, Japanese Association of MIT (JAM), 2025–
- President, UTokyo Philharmonic Orchestra, 2020–2021