

Hiroki Naganuma

LARGE SCALE OPTIMIZATION · DISTRIBUTED SYSTEM · EFFICIENT TRAINING ALGORITHM

✉ hiroki111x.github.io ✉ naganuma.hiroki@mila.quebec ☎ +81 90-6304-6673 in [hiroki111x](#) 📄 [google scholar](#)

📍 Mila - Quebec AI Institute, 6666 Saint-Urbain Street, #200 Montreal, QC, Canada, H2S 3H1

🛂 US Visa Status: O-1 visa, valid through 2028. No H-1B lottery required.

Education

09/20 - present	Université de Montréal and Mila (Quebec AI Institute) Ph.D. Candidate in Computer Science Supervisor: Ioannis Mitliagkas . Topic: Large Scale Optimization, Calibration, and Out-of-Distribution in Deep Neural Networks.	Montréal, QC, Canada
04/17 - 03/19	Tokyo Institute of Technology M.Eng. in Computer Science (Completed Master Course with Summa Cum Laude) Supervisor: Rio Yokota . Thesis title: Smoothing Objective Function in Stochastic Optimization for Large Scale Deep Learning. Exchange student at Georgia Institute of Technology	Tokyo, Japan
04/13 - 03/17	Tokyo Institute of Technology B.Eng. in Computer Science (Completed Bachelor Course with Dean's Award, School of Computing) Supervisor: Rio Yokota . Thesis title: Hierarchical Low Rank Approximation for Convolutional Neural Networks.	Tokyo, Japan

Affiliations

05/25 - 08/25	Meta (Meta Superintelligence Labs) Research Intern Supervisor: Hao-Jun Michael Shi and Parameswaran Raman Topic: Large Batch Training and Semi-Synchronous Training for LLMs.	Menlo Park, CA, United States
09/24 - 02/25	Google DeepMind (Foundational Research Team) Student Researcher Supervisor: Priya Kasimbeg , Atish Agarwala and George E. Dahl . Topic: Machine Learning Foundations.	Mountain View, CA, United States
06/24 - 08/24	Microsoft Research (Phi Model Team) Research Intern Supervisor: Philipp Witte and Russell Hewett . Topic: Semi-Synchronous Training for LLMs.	Redmond, WA, United States
06/21,22,23 - 09/21,22,23	LinkedIn (Foundation AI Technologies Team) Research Intern Supervisor: Chengming Jiang , Mingzhou Zhou , Aman Gupta , Haichao Wei and S. Sathiya Keerthi . Topic: Mitigating Trade-off between Calibration and AUC.	Sunnyvale, CA, United States
04/20 - 08/20	Japan Society for the Promotion of Science Research Fellow Supervisor: Rio Yokota . Topic: Developing Efficient Algorithms based on Smoothing Loss Function for Large Batch Training.	Tokyo, Japan
09/18 - 10/18	RIKEN AIP (Deep Learning Theory Team) Research Intern Supervisor: Taiji Suzuki . Topic: Large Scale Distributed Deep Learning using Natural Gradient Approximation Method	Tokyo, Japan
04/17 - 03/18	IBM Research (HPC and Large Scale Optimization Team) Student Fellow Supervisor: Taro Sekiyama and Kiyokuni Kawachiya . Topic: Optimization and Parallelization of Deep Learning Framework	Tokyo, Japan

Selected Honors

2025	Invited to GRF Workshop	JANE STREET GRADUATE RESEARCH FELLOWSHIP
------	-------------------------	--

2025	Best Reviewer Award	AISTATS 2025
2024	Top Reviewer Award	NEURIPS 2024
2024	Poster Award	JSPS SAN FRANCISCO ANNUAL MEETING
2024	JHPCN Emerging Research Award	JHPCN SYMPOSIUM 2024
2022	Minister of Internal Affairs and Communications Award	JAPAN CAMPUS GRANDPRIX
2018	National Winner, Japan Representative (top 2%)	JAMES DYSON AWARD
2018	Grand Prize (1st in 12 teams)	ART HACK DAY 2018
2017	Best 32, Japan Representative	MICROSOFT IMAGINE CUP 2017 WORLD FINALS
2017	3rd Prize (3rd in 52 teams)	STANFORD HEALTH HACKATHON 2017
2016	First Prize (1st in 89 teams)	JPHACKS-2016 JAPAN'S LARGEST STUDENT HACKATHON
2016	First Prize	MASHUPAWARD-2016 JAPAN'S LARGEST HACKATHON STUDENT DIVISION
2019	Complete Master Course with Summa Cum Laude	TOKYO INSTITUTE OF TECHNOLOGY
2017	Dean's award, School of Computing	TOKYO INSTITUTE OF TECHNOLOGY
2013	Tokyo Metropolitan Governor Award (Graduate First on the List)	TOKYO METROPOLITAN

Selected Grants and Fellowships

10/25	RBC Borealis Global Fellowship ¹	RBC BOREALIS AI GLOBAL FELLOWSHIP AWARD (2024-2025)
04/25 - 03/26	Computational Resource Support (56,000 GPU hours)	UOSAKA AI RESEARCH PROJECTS (FY2025)
11/24 - 08/25	Research Grant (Approx 3,300USD)	THE ANRI FELLOWSHIP
07/24 - 03/25	Computational Resource Support (4,800 GPU hours)	JHPCN JOINT RESEARCH PROJECT (EX24402)
07/24 - 03/25	Computational Resource Support (4,800 GPU hours)	TSUBAME ENCOURAGEMENT PROGRAM (FY2024)
09/23	Computational Resource Support (2,048GPUs x 24H)	ABCI GRAND CHALLENGE PROGRAM (AIST)
07/23 - 03/24	Computational Resource Support (12,000 GPU hours)	JHPCN JOINT RESEARCH PROJECT (EX23401)
07/23 - 03/24	Computational Resource Support (12,000 GPU hours)	TSUBAME ENCOURAGEMENT PROGRAM(FY2023)
09/22 - 08/25	Scholarships for AI Field Scholar	CYBERDYNE AI FELLOWSHIP
09/22 - 08/24	Prestigious Scholarship	SHIGETA EDUCATION FOUNDATION SCHOLARSHIP
07/22 - 03/23	Computational Resource Support (12,000 GPU hours)	JHPCN JOINT RESEARCH PROJECT (EX22401)
07/22 - 03/23	Computational Resource Support (12,000 GPU hours)	TSUBAME ENCOURAGEMENT PROGRAM (FY2022)
09/22 - 08/25	Japanese Government Fellowship	JAPAN STUDENT SERVICES ORGANIZATION
09/21	Computational Resource Support (2,048GPUs x 24hours)	ABCI GRAND CHALLENGE PROGRAM (AIST)
05/21	Computational Resource Support (512GPUs x 168hours)	GRAND-CHALLENGE PROGRAM ON TSUBAME3.0
09/20 - 08/25	Tuition Fee Reduction Scholarship (Approx 68,300 USD)	UNIVERSITÉ DE MONTRÉAL
04/20 - 03/22 (decline)	Fellowship for Young Scientists (Approx 31,400 USD)	JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE
04/20 - 03/22 (decline)	Research Funding (Approx 13,000 USD)	JSPS KAKENHI (20J13997)
12/19	Travel Grant for NeurIPS2019	JAPANESE SOCIETY FOR ARTIFICIAL INTELLIGENCE
04/19 - 03/22	Tokyo Tech Tsubame Scholarship	TOKYO INSTITUTE OF TECHNOLOGY
07/17 - 08/22	Full Scholarship - Support of Tuition/Living Expenses/Research Funding	MASASON FOUNDATION ²
04/17 - 03/19	Partial Support of Living Expenses (acceptance rate < 6.8%)	JAPAN STUDENT SERVICES ORGANIZATION
02/19	Travel Grant for PPOPP2019	JAPAN GOVERNMENT MEXT
09/17 - 03/18	Scholarship (Approx 2,800 USD)	SHINANO-IKUEIKAI
11/16	Travel Grant for Undergraduates Program	SUPERCOMPUTING CONFERENCE (SC16)

¹Selected among top-10 graduate students by Borealis AI, which is an AI arm of the Royal Bank of Canada (RBC).

²A prestigious and highly competitive scholarship founded by SoftBank CEO Masayoshi Son. Awarded to <100 individuals under 25 globally for outstanding achievement.

03/13 (decline) Special Scholarship for Top Score Students (Acceptance Rate < 0.06% =(70/109,934)) MEIJI UNIVERSITY

Peer-Reviewed Journal Publications

Google Scholar: <https://scholar.google.co.jp/citations?user=xx702voAAAAJ&hl>
 Authors who equally contributed to a publication are marked with a †.

- [J5] **Hiroki Naganuma**[†], Xinzhi Zhang[†], Man-Chung Yue, Ioannis Mitliagkas, Russell J. Hewett, Philipp Andre Witte, Yin Tat Lee. "Pseudo-Asynchronous Local SGD: Robust and Efficient Data-Parallel Training." Transactions on Machine Learning Research (**TMLR 2025**) (08/25)
- [J4] **Hiroki Naganuma**[†], Ryuichiro Hataya[†], Kotaro Yoshida, Ioannis Mitliagkas, "An Empirical Study of Pre-trained Model Selection for Out-of-Distribution Generalization and Calibration." Transactions on Machine Learning Research (**TMLR 2025**) (04/25)
- [J3] Masanari Kimura[†], **Hiroki Naganuma**[†]. "Geometric Insights into Focal Loss: Reducing Curvature for Enhanced Model Calibration." **Pattern Recognition Letters** (02/25)
- [J2] Kotaro Yoshida[†], **Hiroki Naganuma**[†]. "Towards Understanding Variants of Invariant Risk Minimization from the Perspective of Calibration." Transactions on Machine Learning Research (**TMLR 2024**) (06/24)
- [J1] **Hiroki Naganuma**, Kartik Ahuja, Shiro Takagi, Tetsuya Motokawa, Rio Yokota, Kohta Ishikawa, Ikuro Sato, Ioannis Mitliagkas. "Empirical Study on Optimizer Selection for Out-of-Distribution Generalizations." Transactions on Machine Learning Research (**TMLR 2023**) (06/23)

Peer-Reviewed Conference Publications

- [C7] Kotaro Yoshida, Yuji Naraki, Takafumi Horie, Ryosuke Yamaki, Ryotaro Shimizu, Yuki Saito, Julian McAuley, **Hiroki Naganuma**. "Mastering Task Arithmetic: τ Jp as a Key Indicator for Weight Disentanglement." The 13th International Conference on Learning Representations (**ICLR 2025**) (Singapore) (04/25) [\[Travel Grant\]](#)
- [C6] Charles Guille-Escuret[†], **Hiroki Naganuma**[†], Kilian Fatras, Ioannis Mitliagkas. "No Wrong Turns: The Simple Geometry Of Neural Networks Optimization Paths." International Conference on Machine Learning (**ICML 2024**) (Vienna, Austria) (07/24)
- [C5] Keigo Tada, **Hiroki Naganuma**. "How Image Corruption and Perturbation Affect Out-Of-Distribution Generalization and Calibration." International Joint Conference on Neural Networks (IJCNN 2023) (Gold Coast, Australia) (06/23) [\[Travel Grant\]](#)
- [C4] **Hiroki Naganuma**, Hideaki Iiduka. "Conjugate Gradient Method for Generative Adversarial Networks." The 26th International Conference on Artificial Intelligence and Statistics (**AISTATS 2023**) (Valencia, Spain) (05/23)
- [C3] Kilian Fatras, **Hiroki Naganuma**, Ioannis Mitliagkas. "Optimal Transport Meets Noisy Label Robust Loss and MixUp Regularization for Domain Adaptation." The Conference on Lifelong Learning Agents (**CoLLAs 2022**) (Montreal, Canada) (08/22)
- [C2] **Hiroki Naganuma**, Rio Yokota. "Accelerating Convolutional Neural Networks Using Low Precision Arithmetic." The International Conference on High Performance Computing in Asia-Pacific Region (HPC Asia 2018) (Tokyo, Japan) (01/18)
- [C1] Kazuki Osawa, Akira Sekiya, **Hiroki Naganuma**, and Rio Yokota. "Accelerating Matrix Multiplication in Deep Learning by using Low-Rank Approximation." The 2017 International Conference on High Performance Computing & Simulation (HPCS 2017) (Genoa, Italy) (07/17)

Working Paper

- [W2] **Hiroki Naganuma** et al. "Critical Batch Size in Non-Euclidean Optimization: A Generalized Gradient Noise Scale Framework"
- [W1] **Hiroki Naganuma** et al. "Regularizing Block-Orthonormalized Updates to Reduce Global Orthogonalization in Muon Optimizer on FSDP"

Preprint / Papers Under Review

- [P6] Kotaro Yoshida, Takafumi Horie, Yuji Naraki, Ryotaro Shimizu, **Hiroki Naganuma**. "DiTaC: Conditioning Task Vectors via Distillation for Robust Model Merging." (Preprint) (07/25)
- [P5] Naoki Sato, **Hiroki Naganuma**, Hideaki Iiduka, "Convergence Bound and Critical Batch Size of Muon Optimizer" (Preprint) (07/25)
- [P4] **Hiroki Naganuma**, Akira Uehara, Takeru Sakurai, Yoshiyuki Sankai, "When Does Alignment Help? A Comparative Study of DCCA and Fusion-Based Approaches for Multi-modal Chest X-ray Analysis" (Under Review) (04/25)
- [P3] **Hiroki Naganuma**[†], Kotaro Yoshida[†], Laura Gomezjurado Gonzalez[†], Takafumi Horie, Yuji Naraki, Ryotaro Shimizu, . "On Fairness of Task Arithmetic: The Role of Task Vectors." (Under Review) (04/25)
- [P2] Yuji Naraki[†], Ryosuke Yamaki[†], Yoshikazu Ikeda, Takafumi Horie, Kotaro Yoshida, Ryotaro Shimizu, **Hiroki Naganuma**. "Augmenting NER Datasets with LLMs: Towards Automated and Refined Annotation." (Arxiv Preprint) (03/24)
- [P1] **Hiroki Naganuma**, Taiji Suzuki, Rio Yokota, Masahiro Nomura, Kohta Ishikawa, Ikuro Sato. "Takeuchi's Information Criteria as Generalization Measures for DNNs Close to NTK Regime." (Preprint) (09/21)

International Workshop and Symposium Publications

- [WS9] Laura Gomezjurado Gonzalez[†], **Hiroki Naganuma**[†], Kotaro Yoshida[†], Takafumi Horie, Yuji Naraki, Ryotaro Shimizu, . "On Fairness of Task Arithmetic: The Role of Task Vectors." NeurIPS2025 Workshop on Reliable ML from Unreliable Data (San Diego, US) (12/25)
- [WS8] **Hiroki Naganuma**[†], Junhyung Lyle Kim[†], Anastasios Kyrillidis, Ioannis Mitliagkas. "Smoothness-Adaptive Sharpness Aware Minimization for Finding Flatter Minima." ICLR2024 Workshop on Practical ML for Low Resource Settings, 2024 (Vienna, Austria) (05/24)
- [WS7] Haruka Kumagai, Ryosuke Yamaki, **Hiroki Naganuma**. "Story-to-Images Translation: Leveraging Diffusion Models and Large Language Models for Sequence Image Generation." ACM MM2023 Workshop on User-centric Narrative Summarization of Long Videos (NarSUM) (Ottawa, Canada) (10/23) [[Travel Grant](#)]
- [WS6] **Hiroki Naganuma**[†], Masanari Kimura[†]. "On the Interplay of Curvature, Calibration and Out-of-Distribution Generalization: Insights from SAM and Focal Loss Analyses." ICCV2023 Workshop on Uncertainty Quantification for Computer Vision (UNCV) (Paris, France) (10/23)
- [WS5] **Hiroki Naganuma**[†], Masanari Kimura[†]. "Necessary and Sufficient Hypothesis of Curvature: Understanding Connection Between Out-of-Distribution Generalization and Calibration." ICLR 2023 Workshop on Domain Generalization (Kigali Rwanda) (05/23)
- [WS4] **Hiroki Naganuma**. "Towards Understanding the Relationship of Batch Size and Iterations in Deep Learning." The Machine Learning Summer School (MLSS2020 in Tübingen) (Tübingen, Germany (Online)) (06/20)
- [WS3] **Hiroki Naganuma**, Rio Yokota. "On Empirical Analysis of Layer-wise Learning Rate Schedule." The 11th Asian Conference on Machine Learning (ACML 2019) Workshop (Nagoya, Japan) (11/19)

- [WS2] **Hiroki Naganuma**, Rio Yokota. "A Performance Improvement Approach for Second-Order Optimization in Large Mini-batch Training." 2nd High Performance Machine Learning Workshop held in conjunction with CCGrid2019 (HPML2019) (Larnaca, Cyprus) (05/19)
- [WS1] **Hiroki Naganuma**, Rio Yokota. "Noise Injection Leads to Better Generalization in Large Mini-Batch Training." Tokyo Institute of Technology and Stony Brook University Joint Science and Technology Meeting (Tokyo, Japan) (05/19)

Domestic Journal and Conference

- [D44] Naoki Sato, **Hiroki Naganuma**, Hideaki Iiduka, "Analysis of Muon's convergence and critical batch size." The 2025 Fall National Conference of Operations Research Society of Japan (Hiroshima, Japan) (09/25)
- [D43] Kotaro Yoshida[†], Takafumi Horie[†], Yuji Naraki, Ryotaro Shimizu, Ryosuke Yamaki, **Hiroki Naganuma**. "Evaluating the Effectiveness of Model Linearization in Task Analogies." The 39th Annual Conference of the Japanese Society for Artificial Intelligence (JSAIL2025) (Osaka, Japan) (05/25)
- [D42] Kotaro Yoshida[†], **Hiroki Naganuma**[†]. "Towards Understanding Variants of Invariant Risk Minimization from the Perspective of Calibration." The 1st Symposium of Young Researcher Association for Machine Learning (YAML2024) (Shizuoka, Japan) (09/24) [\[Travel Grant\]](#)
- [D41] Kotaro Yoshida[†], Yuji Naraki[†], Ryosuke Yamaki[†], Takafumi Horie, Ryotaro Shimizu, Yuki Saito, **Hiroki Naganuma**. "A Closer Look at Task Analogies: Insights from Function and Parameter Space." The 19th Symposium of Young Researcher Association for NLP Studies (YANS2024) (Osaka, Japan) (09/24) [\[Travel Grant\]](#)
- [D40] Yuji Naraki[†], Ryosuke Yamaki[†], Yoshikazu Ikeda, Takafumi Horie, **Hiroki Naganuma**. "Toward Cost-Effective Named Entity Recognition: Navigating the Complexities of Automated Annotation through Large Language Models." The 30th Annual Meeting of the Association for Natural Language Processing (NLP2024) (Kobe, Japan) (03/24)
- [D39] Kaisei Takahashi, **Hiroki Naganuma**. "Averaging Multi-domain Models for Continual Reinforcement Learning to Mitigate Catastrophic Forgetting." The 86th National Convention of Information Processing Society of Japan (IPSJ2024) (Yokohama, Japan (Online)) (03/24)
- [D38] Kotaro Yoshida[†], **Hiroki Naganuma**[†]. "Towards Understanding Variant Methods of Invariant Risk Minimization from the Perspective of Calibration." The 86th National Convention of Information Processing Society of Japan (IPSJ2024) (Yokohama, Japan (Online)) (03/24) [\[Student Encouragement Award\]](#)
- [D37] Kaisei Takahashi, **Hiroki Naganuma**. "Averaging Multi-domain Models for Robust Deep Reinforcement Learning under Distribution Shifts." Forum for Information and Technology 2023 (FIT2023) (Osaka, Japan (Online)) (09/23) [\[FIT Encouragement Award\]](#)
- [D36] Kotaro Yoshida, Keigo Tada[†], **Hiroki Naganuma**[†]. "Uncertainty Calibration in Deep Neural Networks through Invariant Risk Minimization." Forum for Information and Technology 2023 (FIT2023) (Osaka, Japan (Online)) (09/23)
- [D35] **Hiroki Naganuma**. "Comprehensive Evaluation of the Next Generation Optimizers on Out of Distribution Generalization." The 15th JHPCN symposium (Tokyo, Japan (Online)) (07/23)
- [D34] Haruka Kumagai, Ryosuke Yamaki, **Hiroki Naganuma**. "Diffusion Model Incorporating Context Information of Narratives." Meeting on Image Recognition and Understanding 2023 (MIRU2023) (Shizuoka, Japan) (07/23)
- [D33] Keigo Tada, **Hiroki Naganuma**. "Measuring the Effect of Image Corruption and Perturbation through the Lens of Calibration and Out-of-Distribution Generalization." The 85th National Convention of Information Processing Society of Japan (IPSJ2023) (Tokyo, Japan (Online)) (03/23) [\[Student Encouragement Award\]](#)

- [D32] Kaisei Takahashi, **Hiroki Naganuma**. "A Weight Averaging Method Mitigates the Effect of Distribution Shift in Deep Reinforcement Learning." The 85th National Convention of Information Processing Society of Japan (IPSJ2023) (Tokyo, Japan (Online)) (03/23)
- [D31] Ryosuke Yamaki, Yuji Naraki, **Hiroki Naganuma**. "Analysis of Script Data with Large Language Model: Exploring and Evaluating Product Placement Insertion Points." The 29th Annual Meeting of the Association for Natural Language Processing (NLP2023) (Okinawa, Japan) (03/23) [[Hakuhodo DY Media Partners Inc. Award](#)]
- [D30] Keigo Tada[†], **Hiroki Naganuma**[†]. "Effect of Distribution Shift on Out-of-Distribution Generalization and Uncertainty." Forum for Information and Technology 2022 (FIT2022) (Kanagawa, Japan (Online)) (09/22)
- [D29] Kaisei Takahashi[†], **Hiroki Naganuma**[†]. "A Preliminary Study of Explore-Exploit Tradeoff in Reinforcement Learning with Stochastic Weight Averaging." Forum for Information and Technology 2022 (FIT2022) (Kanagawa, Japan (Online)) (09/22)
- [D28] **Hiroki Naganuma**, Gaku Fujimori, Mari Takeuchi, Jumpei Nagase. "Scheduling of Damping in Natural Gradient Method." The 36th Annual Conference of the Japanese Society for Artificial Intelligence (JSAI2022) (Kyoto, Japan (Online)) (06/22)
- [D27] Gaku Fujimori, Jumpei Nagase[†], **Hiroki Naganuma**[†]. "The Effect of Damping on Positive Definiteness of Fisher Information Matrix in Natural Gradient Descent and Escaping Saddle Point." The 84th National Convention of Information Processing Society of Japan (IPSJ2022) (Ehime, Japan (Online)) (03/22)
- [D26] Gaku Fujimori, Jumpei Nagase, **Hiroki Naganuma**. "Effects of Adaptive Damping in Second-Order Optimization of DNN Models with Skip-Connection." Japan Society for Industrial and Applied Mathematic (JSIAM2021) (Saitama, Japan (Online)) (09/21)
- [D25] Jumpei Nagase, **Hiroki Naganuma**. "Trainability of Neural Networks with Skip-Connection by Preconditioned Optimizer." Forum for Information and Technology 2021 (FIT2021) (Online) (08/21)
- [D24] Yuji Naraki, Tetsuya Motokawa, **Hiroki Naganuma**. "Relationship between Consistency Loss Decay and Generalization in Semi-Supervised Learning." The 83rd National Convention of Information Processing Society of Japan (IPSJ2021) (Online) (03/21)
- [D23] Tetsuya Motokawa, **Hiroki Naganuma**, Tatsuro Ide. "A Study of the Effect on Hessian Spectrum according to the Approximation Method in Deep Neural Networks." The 83rd National Convention of Information Processing Society of Japan (IPSJ2021) (Online) (03/21)
- [D22] **Hiroki Naganuma**, Masahiro Nomura, Rio Yokota. "An Analysis of Generalization Measures in Training Process of DNN, and Application to Hyperparameter Optimization." The 23rd Information-Based Induction Sciences Workshop (IBIS2020) (Tsukuba, Japan (Online)) (11/20)
- [D21] Takahiro Shohata, **Hiroki Naganuma**, Rio Yokota. "An Experimental Analysis of Hyperparameters Effect to Generalization in Stochastic Weight Averaging." The 23rd Information-Based Induction Sciences Workshop (IBIS2020) (Tsukuba, Japan (Online)) (11/20)
- [D20] Yuji Naraki, Tetsuya Motokawa, **Hiroki Naganuma**. "Towards Understanding the Effect of Model Averaging in Semi-Supervised Learning from the Perspective of Hessian Spectrum Analysis." The 23rd Information-Based Induction Sciences Workshop (IBIS2020) (Tsukuba, Japan (Online)) (11/20)
- [D19] Tatsuro Ide, Tetsuya Motokawa, **Hiroki Naganuma**. "Performance Evaluation of Approximation Methods of Calculation for Information Matrix." The 23rd Information-Based Induction Sciences Workshop (IBIS2020) (Tsukuba, Japan (Online)) (11/20)
- [D18] **Hiroki Naganuma**, Rio Yokota. "A Preliminary Study of the LARS Effect to Large Batch Training Problem." CREST AI Projects Joint Meeting 2020 (Online) (09/20)

- [D17] **Hiroki Naganuma**, Tatsuro Ide, Rio Yokota. "Measuring the Effects to Beneficial Batch Size and Required Iteration by LARS on Neural Network Training." The 34th Annual Conference of the Japanese Society for Artificial Intelligence (JSAI2020) (Kumamoto, Japan (Online)) (06/20)
- [D16] Takahiro Shohata, **Hiroki Naganuma**, Rio Yokota. "Verification of Generalization Performance Improvement using Stochastic Weight Averaging in Large Batch Training." The 82nd National Convention of Information Processing Society of Japan (IPSJ2020) (Kanazawa, Japan (Online)) (03/20)
- [D15] **Hiroki Naganuma**, Rio Yokota. "Proposal of Initial Learning Rate Determination Method in Training with Layer-wise Adaptive Rate Scaling." The 22nd Information-based Induction Sciences Workshop (IBIS2019) (Nagoya, Japan) (11/19)
- [D14] Keiko Yamamoto, **Hiroki Naganuma**, Toshiya Yui, Masafumi Harada, Kazuyoshi Fukutani, Osao Hori, Takayuki Fikusawa. "Astral Body: The Expression of "Sense of Life" by a Kinetic Surface Using Ferromagnetic Powder." Transactions of the Virtual Reality Society of Japan, Vol. 24, No. 3 (09/19)
- [D13] **Hiroki Naganuma**, Rio Yokota. "A Preliminary Study of Adaptive Learning Rate for Stochastic Optimization in Convolutional Neural Network." CREST 3 AI Projects Joint Meeting 2019 (Kanagawa, Japan) (08/19)
- [D12] **Hiroki Naganuma**, Rio Yokota. "Investigation of Smoothing in Natural Gradient Method for Large Mini-batch Training." The 3rd cross-disciplinary Workshop on Computing Systems, Infrastructures, and Programming (xSig2019) (Kanagawa, Japan) (05/19) [\[Outstanding Presentation Award\]](#)
- [D11] **Hiroki Naganuma**, Shun Iwase, Rio Yokota. "Verification of the Reducing the Number of Iterations in Large Mini-Batch Training by Applying Mixup." The 3rd cross-disciplinary Workshop on Computing Systems, Infrastructures, and Programming (xSig2019) (Kanagawa, Japan) (05/19)
- [D10] **Hiroki Naganuma**, Rio Yokota. "A Study on Generalization Performance Improvement Method on Large Batch Learning Using Averaging by Noise Injection." The Institute of Electronics Information and Communication Engineers General Conference 2019 (IEICE2019) (Tokyo, Japan) (03/19) [\[Poster Award\]](#)
- [D9] **Hiroki Naganuma**, Rio Yokota. "Smoothing of Objective Function for Large Scale Parallel Deep Learning." The 81st National Convention of Information Processing Society of Japan (IPSJ2019) (Fukuoka, Japan) (03/19)
- [D8] **Hiroki Naganuma**, Rio Yokota. "Smoothing of the Objective Function in Stochastic Optimization for Large Scale Parallel Learning." CREST-Deep Symposium (Tokyo, Japan) (11/18)
- [D7] **Hiroki Naganuma**, Shun Iwase, Kinsho Kaku, Hikaru Nakata, Rio Yokota. "Hyperparameter Optimization of Large Scale Parallel Deep Learning using Natural Gradient Approximation Method." Forum for Information and Technology 2018 (FIT2018) (Fukuoka, Japan) (09/18)
- [D6] **Hiroki Naganuma**, Akira Sekiya, Kazuki Osawa, Hiroyuki Ootomo, Yuji Kuwamura, Rio Yokota. "Verification of speeding up using low precision arithmetic in convolutional neural network." GTC Japan 2017 Poster Session (Tokyo, Japan) (12/17)
- [D5] **Hiroki Naganuma**, Akira Sekiya, Kazuki Osawa, Hiroyuki Ootomo, Yuji Kuwamura, Rio Yokota. "Improvement of speed using low precision arithmetic in deep learning and performance evaluation of accelerator." Technical Committee on Pattern Recognition and Media Understanding (PRMU) (Kumamoto, Japan) (10/17)
- [D4] Kazuki Osawa, Akira Sekiya, **Hiroki Naganuma**, Rio Yokota. "Accelerating Convolutional Neural Networks Using Low-Rank Tensor Decomposition." Technical Committee on Pattern Recognition and Media Understanding (PRMU) (Kumamoto, Japan) (10/17)
- [D3] **Hiroki Naganuma**, Kazuki Osawa, Akira Sekiya, Rio Yokota. "Acceleration of Compression Model Using Half-Precision Arithmetic in Deep Learning." Japan Society for Industrial and Applied Mathematic (JSIAM2017) (Tokyo, Japan) (09/17)

[D2] Kazuki Osawa, Akira Sekiya, **Hiroki Naganuma**, Rio Yokota. "Accelerating Convolutional Neural Networks Using Low-Rank Approximation." Proceedings of the Conference on Computational Engineering and Science Vol. 22 (Saitama, Japan) (05/17)

[D1] Akira Sekiya, Kazuki Osawa, **Hiroki Naganuma**, Rio Yokota. "Acceleration of Matrix Multiplication of Deep Learning Using Low Rank Approximation." 158th Research Presentation Seminar in High Performance Computing (Shizuoka, Japan) (05/17)

Skills

Programming: Python, C++ , HPC (CUDA, MPI, NCCL, OpenMP)

Framework: PyTorch, Jax, Horovod, LLM (DeepSpeed, Apex, Huggingface, TorchTitan (FSDP2))

DevOps/Tools: Git, Slurm, Wandb, Docker, Azure, GCP

Languages: Japanese (Native), English (Proficient), French (Beginner), Mandarin (Beginner)

Personal: Teamwork, Leadership, Achiever, Analytical / based on Clifton Strengthsfinder

Academic Service

2023 - present	Refereeing	
2025-	Reviewer, Transactions on Machine Learning Research (TMLR)	2025
2025-	Reviewer, Conference on Language Modeling (COLM)	2025
2025-	Reviewer, International Conference on Learning Representations (ICLR)	2025
2024-	Reviewer, Annual Conference on Artificial Intelligence and Statistics (AISTATS)	2024, 2025
	(Best Reviewer - 2025)	
2024-	Reviewer, Neural Information Processing Systems (NeurIPS)	2024
	(Top Reviewer - 2024)	
2023-	Reviewer, Workshops: ICLR2023 Domain Generalization	2023

Mentoring

08/24 - present	Laura Gomezjurado Gonzalez Undergraduate Student at Stanford University → Research Intern at Microsoft Research (Redmond) NeurIPS2025 WS
04/23 - present	Kotaro Yoshida Undergraduate Student at Tokyo Institute of Technology → Research Intern at A*STAR Singapore Student Encouragement Award - IPSJ2024, TMLR2024, NeurIPS2024 WS, ICLR2025
04/23 - present	Takafumi Horie Master Student at Ritsumeikan University → PhD Student at Kyoto University NeurIPS2024 WS, ICLR2025
05/23 - 10/23	Haruka Kumagai Master Student at University of Tokyo → Visiting Researcher at University of Trento ACMMM2023 Workshop, Travel Grant from NEC C&C Foundation
04/22 - 03/23	Keigo Tada Master Student at Ritsumeikan University → Research Scientist at Sony IJCNN2023 / Student Encouragement Award - IPSJ2023

Invited Talks

12/25	NVIDIA (Host: Russell Hewett)
12/25	CUNY-JSPS Forum on Artificial Intelligence (Host: John Tsapogas)

- 05/25 The 10th Mathematical Optimization Seminar at Meiji University
(Host: Hideaki Iiduka)
- 03/25 Spring Seminar Series: Ottawa Japanese Researchers Association
(Host: Yasutsugu Tamura)
- 11/24 The 25th Lecture Series: Japan Healthcare Innovation Hub
(Host: Anna Nakayasu)
- 09/24 Seminar Series: Montreal Academy Club
(Host: Norio Tomita)
- 08/24 The 4th Lecture Series: Seattle Japanese Research Community
(Host: Masa Nakashima)
- 11/23 The 8th Mathematical Optimization Seminar at Meiji University
(Host: Hideaki Iiduka)
- 02/23 RICOS×ZOZO NeurIPS2022 Paper Reading Group
(Host: Masanari Kimura)
- 01/22 The 54th AI Seminar ABCI Grand Challenge
(Host: Yusuke Tanimura)
- 06/21 The 6th Mathematical Optimization Seminar at Meiji University
(Host: Hideaki Iiduka)
- 02/22 Montréal Machine Learning and Optimization
(Host: Ioannis Mitliagkas)
- 08/20 Summer Seminar Series: The Japanese Graduate Student Association in the United States (JGSAU)
(Host: Kai Narita)
- 05/20 The 78th Artificial Intelligence Seminar: AI Trend - Top Conference Report Session (NeurIPS2019)
(Host: Togami Masahito)

Media Coverage

- 08/25 Nikkei Robotics / Efficient Model Finetuning [\[link\]](#)
- 03/23 UTokyo IPC 1st Round [\[link\]](#)
- 02/23 Carbon Magazine [\[link\]](#)
- 06/22 JAIST News / Japan Campus Grand Prix [\[link\]](#)
- 06/22 Design and Make with Auto Desk / Develops Walky: A Smart Electronic White Cane [\[link\]](#)
- 09/18 Tokyo Tech News / James Dyson Award 2018 [\[link\]](#)
- 09/18 The National Museum of Emerging Science and Innovation (Miraikan) / Exhibition [\[link\]](#)
- 12/17 Tokyo Tech News / Stanford Health Hackathon [\[link\]](#)
- 01/17 Tokyo Tech News / Japan's Largest Student Hackathon [\[link\]](#)
- 12/16 TV Tokyo / A Smart Electronic White Cane [\[link\]](#)
- 04/15 CG ARTS Education Report [\[link\]](#)
- 06/12 Nikkei / Selected Report from High School Student [\[link\]](#)

Leadership & Service

Academic & Community Leadership

- 10/25 – present **Admission Committee Member**, Mila supervision (PhD & MS in fall 2026)
- 02/23 – present **Board Member**, Montréal Japanese Academy Society
- 02/23 – present **Founding Member**, JSPS Alumni Association, Québec Chapter
- 09/22 – 08/25 **Divisional Director**, The Japanese Graduate Student Association in the US
- 11/17 – 12/19 **Student Representative**, Organization for Inviting EXPO2025 to OSAKA
- 08/16 – 03/19 **Vice President**, TITAMAS – Led to represent Japan at the Microsoft Imagine Cup 2017

Selected Competitive Programs & Workshops

- 01/26 - 02/26 **Selected Attendee**, ACM Second Asian School on HPC and Artificial Intelligence
- 05/23 - 12/23 **Selected Attendee**, UTokyo IPC 1stRound (8th Generation)
- 02/23 - 03/23 **Selected Attendee**, Tokyo Tech CUMOT Entrepreneur Program (1st Generation)
- 09/22 - 03/23 **Selected Attendee**, NEDO Technology Commercialization¹ Program
- 07/20 **Selected Attendee**, The Machine Learning Summer School 2020 (acceptance rate <14%).
- 03/20 **Selected Reporter & Presenter**, Top Conference Reports (JSAI)
- 02/19 - 03/19 **Selected Attendee**, Georgia Tech Leadership Program
- 09/19 **Selected Attendee**, Leadership Training Program powered by JT (acceptance rate <1%)
- 01/19 **Selected Attendee**, International HPC Summer School 2019
- 11/16 **Selected Attendee**, SC16 HPC for Undergraduates Program
- 03/16 **Selected Attendee**, Silicon Valley Workshop 2016 sponsored by Recruit Holdings Co., Ltd.

Teaching & Technical Service

- 08/24 - 09/24 **Teaching Volunteer**, Kids Code Club
- 04/20 - 08/20 **Researcher**, Global Data Science Project for COVID-19
- 11/18 **Teaching Assistant**, GTC Japan, Deep Learning Institute Workshop
- 08/16 **Teaching Assistant**, Supercomputing Contest 2016
- 05/17 **Visual Director**, TEDxUTokyo 2017
- 09/16 **Leader & Chief Engineer**, Musashino Art University Festival
- 06/13 - 09/18 **Teaching Assistant**, Life is Tech! ²

¹Japanese government-sponsored R&D commercialization program with mentorship.

²The largest coding bootcamp in Japan for middle and high school students.