

Yutong Wang

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Research Interests

Theory of overparametrized learning. Exactly or nearly interpolating models. Phenomena in multiclass classification. Efficient machine learning (ML) via compression. ML for science: genomics, spectroscopy, and ecology.

Professional Experience

Eric and Wendy Schmidt AI in Science Postdoctoral Fellow	Jan 2023 - Present
University of Michigan, Ann Arbor	
Postdoctoral Research Fellow	Sep 2022 - Jan 2023
University of Michigan, Ann Arbor	

Education

PhD, Electrical & Computer Engineering	Sep 2016 - Aug 2022
University of Michigan, Ann Arbor	
Thesis: <i>Classification via Multiple Hyperplanes: Loss functions, Overparametrization, and Interpolation.</i> [Link]	
Advisor: Prof. Clayton Scott	
MA, Mathematics	Sep 2014 - Jun 2016
University of California, Davis	
BSE, Electrical Engineering (Minor in Mathematics)	Sep 2010 - Apr 2014
University of Michigan, Ann Arbor	

Grants

NSF CISE Medium, Award # 2312842	2023
<i>Collaborative Research: RI: Medium: Principles for Optimization, Generalization, and Transferability via Deep Neural Collapse</i>	
Budget: \$1,200,000, Period Covered: 10/01/2023 - 09/30/2026	
PI: Zhihui Zhu, Co-PI: Jeremias Sulam, Co-PI: Qing Qu, Senior Personnel: Yutong Wang	

Preprints

- [2] Pengyu Li, **Yutong Wang**, Xiao Li, and Qing Qu. “A Geometric Analysis of Multi-label Learning under the Pick-all-label Loss through Neural Collapse”. Submitted to *International Conference on Learning Representations*. 2024.
- [3] **Yutong Wang**, Rishi Sonthalia, and Wei Hu. “Near-Interpolators: Rapid Norm Growth and the Trade-Off between Interpolation and Generalization”. Submitted to *International Conference on Artificial Intelligence and Statistics*. 2024.
- [4] Zhiwei Xu, **Wang, Yutong**, Spencer Frei, Gal Vardi, and Wei Hu. “Benign Overfitting and Grokking in ReLU Networks for XOR Cluster Data”. <https://arxiv.org/abs/2310.02541>, Submitted to *International Conference on Learning Representations*. 2024.

- [5] Jiayi Chen, Pengyu Li, **Wang, Yutong**, Pei-Cheng Ku, and Qing Qu. “Accelerating Deep Learning in Reconstructive Spectroscopy with Device-Informed Data Simulation”. Submitted to *International Conference on Acoustics, Speech, and Signal Processing*. 2024.
- [6] James Boyko, Nathan Fox, **Wang, Yutong**, and Yiluan Song. “Monitoring Plant-Pollinator Networks by Integrating Museum Data, Citizen Science and Computer Vision”. In preparation. Poster to appear at *2023 U-M Data Science and AI Summit*.
- [7] Joseph Cohen, Andreas Rauch, Jennifer Li, Bernardo Modenesi, James Boyko, **Wang, Yutong**, Eunshin Byon, and Xun Huan. “Sparse Modeling of Wavelet Features for Fault Classification and Regression in Spacecraft Propulsion Systems”. In preparation. Poster appeared in *Asia Pacific Conference of the Prognostics and Health Management Society 2023*.

Publications

- [8] **Yutong Wang** and Clayton Scott. “On Classification-Calibration of Gamma-Phi Losses”. In: *Conference on Learning Theory*. 2023.
- [9] **Yutong Wang** and Clayton Scott. “Consistent Interpolating Ensembles via the Manifold-Hilbert Kernel”. In: *Neural Information Processing Systems*. 2022.
- [10] **Yutong Wang** Jianxin Zhang and Clayton Scott. “Learning from Label Proportions by Learning with Label Noise”. In: *Neural Information Processing Systems*. 2022.
- [11] **Yutong Wang** and Clayton Scott. “VC dimension of partially quantized neural networks in the over-parametrized regime”. In: *International Conference on Learning Representations*. 2022.
- [12] **Yutong Wang** and Clayton Scott. “An exact solver for the Weston-Watkins SVM subproblem”. In: *International Conference on Machine Learning*. 2021.
- [13] **Yutong Wang** and Clayton Scott. “Weston-Watkins Hinge Loss and Ordered Partitions”. In: *Neural Information Processing Systems*. 2020.
- [14] Tasha Thong, **Yutong Wang**, Michael Brooks, Christopher Lee, Clayton Scott, Laura Balzano, Max Wicha, and Justin Colacino. “Hybrid stem cell states: insights into the relationship between mammary development and breast cancer using single-cell transcriptomics”. In: *Frontiers in Cell and Developmental Biology* 8 (2020), p. 288.

Technical Reports

- [1] **Wang, Yutong**, Tasha Thong, Venkatesh Saligrama, Justin Colacino, Laura Balzano, and Clayton Scott. “A gene filter for comparative analysis of single-cell RNA-sequencing trajectory datasets”. <https://www.biorxiv.org/content/10.1101/637488v1>. 2019.

Presentations

Closed-form Solutions of Learning Dynamics for Two-layer Nets for Collapsed Orthogonal Data
Third Workshop on Seeking Low-Dimensionality in Deep Neural Networks (SLOWDNN). [Link]

Consistent Interpolating Ensembles

Workshop on the Theory of Overparameterized Machine Learning (TOPML 2022). [Link]

Domain adaptation for spatial and dissociated gene expression data

Learning Meaningful Representations of Life (LMRL) Workshop at NeurIPS. [Link]

Awards and Honors

UM Postdoctoral Association Conference Award	2023
NeurIPS Scholar Award	2022
Honorable Mention for Outstanding Graduate Student Instructors and Instructional Aides	2021
NIH-sponsored travel award for NeurIPS Conference workshop NeurIPS 2019 Conference workshop: “Learning Meaningful Representations of Life”	2019
The Rollin M. Gerstacker Foundation Fellowship	2016
Dean’s List	7 times
University Honors	4 times

Teaching Experience

Group leader Midwest Research Experience for Graduates [link] Advised four PhD students early in their programs on machine learning research over the course of two weeks.	Summer 2023
Group leader assistant Michigan Research Experience for Graduates [link] Advised five PhD students early in their programs on machine learning research over the course of two weeks.	Summer 2022
Graduate student instructor University of Michigan, Ann Arbor, EECS 598 Statistical Learning Theory Received ECE GSI Honorable Mention for my teaching efforts.	Winter 2021
Guest lecturer University of Michigan, Ann Arbor, SW 508 Essentials of Social Welfare Policy Lecture topic: Fairness in machine learning and its impact on social policy. Course instructor: Rita Xiaochen Hu.	Fall 2021
Teaching assistant University of California, Davis Courses taught: MAT 21C Calculus: Partial Derivatives and Series, Winter 2015, Fall 2015, Winter 2016, and Winter 2016. MAT 21D Vector Analysis, Fall 2014, and Spring 2016.	Winter 2015 - Spring 2016

Professional Services

Reviewer (conferences)

Conference on Learning Theory (COLT) 2023

Neural Information Processing Systems (NeurIPS) 2023

International Conference on Learning Representations (ICLR) 2023 Workshop on Domain Generalization

International Conference on Machine Learning (ICML) 2020

Reviewer (journals)

Proceedings of the National Academy of Sciences (PNAS) of the United States of America

IEEE Transactions on Signal Processing

Journal of Machine Learning Research (JMLR)

Curriculum Committee Member

Helped with the development of instructional materials for future cohorts of Schmidt AI in Science postdocs

Co-organizer for AI in Science & Engineering Day [link](#)

Responsibilities include developing agenda and inviting speakers

Judge for Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS) 2023. [link](#)

Group leader for NeurIPS 2022 High School Outreach Program at New Orleans. [link](#)

Tutor at STEM Café at Women's Resources and Research Center, UC Davis

2015-2016

Volunteered as a tutor in calculus, probability and combinatorics.

Community Service

Volunteer for Ann Arbor Meals on Wheels

2022-2023

Once a week meal delivery for older adults in Ann Arbor.