

# Yutong Wang

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Citizenship: USA

## Research Interests

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Theory and efficient computations for multiclass classification when the number of labels is extremely large  
Overparametrized learning and benign overfitting  
Quantization techniques in deep learning  
AI and ML for science: computational biology, deep learning for spectroscopy, and ecology

## Professional Experience

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<b>Eric and Wendy Schmidt AI in Science Postdoctoral Fellow</b> University of Michigan, Ann Arbor Advisors: Qing Qu, Wei Hu	Jan 2023 - Present
<b>Postdoctoral Research Fellow</b> University of Michigan, Ann Arbor	Sep 2022 - Jan 2023

## Education

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

## Publications

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- [1] **Yutong Wang**, Rishi Sonthalia, and Wei Hu. “Near-Interpolators: Rapid Norm Growth and the Trade-Off between Interpolation and Generalization”. In: *Artificial Intelligence and Statistics*. 2024.
- [2] Zhiwei Xu, **Wang, Yutong**, Spencer Frei, Gal Vardi, and Wei Hu. “Benign Overfitting and Grokking in ReLU Networks for XOR Cluster Data”. In: *International Conference on Learning Representations*. [\[Link\]](#). 2024.
- [3] **Yutong Wang** and Clayton Scott. “On Classification-Calibration of Gamma-Phi Losses”. In: *Conference on Learning Theory*. [\[Link\]](#). 2023.
- [4] **Yutong Wang** and Clayton Scott. “Consistent Interpolating Ensembles via the Manifold-Hilbert Kernel”. In: *Neural Information Processing Systems*. [\[Link\]](#). 2022.

- [5] **Yutong Wang** Jianxin Zhang and Clayton Scott. “Learning from Label Proportions by Learning with Label Noise”. In: *Neural Information Processing Systems*. [\[Link\]](#). 2022.
- [6] **Yutong Wang** and Clayton Scott. “VC dimension of partially quantized neural networks in the overparametrized regime”. In: *International Conference on Learning Representations*. [\[Link\]](#). 2022.
- [7] **Yutong Wang** and Clayton Scott. “An exact solver for the Weston-Watkins SVM subproblem”. In: *International Conference on Machine Learning*. [\[Link\]](#). 2021.
- [8] **Yutong Wang** and Clayton Scott. “Weston-Watkins Hinge Loss and Ordered Partitions”. In: *Neural Information Processing Systems*. [\[Link\]](#). 2020.
- [9] 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). [\[Link\]](#), p. 288.

## Preprints

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- [10] **Yutong Wang** and Clayton Scott. “Unifying Binary and Multiclass Margin-Based Classification”. [\[arXiv\]](#), Submitted to *Journal of Machine Learning Research*. 2023.
- [11] Pengyu Li\*, **Yutong Wang**\*, Xiao Li, and Qing Qu. “Neural Collapse in Multi-label Learning with Pick-all-label Loss”. [\[arXiv\]](#), Submitted to *International Conference on Learning Representations*. 2024.
- [12] Jiyi 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.
- [13] James Boyko, Nathan Fox, **Wang, Yutong**, Yiluan Song, and Yu Zhou. “Monitoring Plant-Pollinator Networks by Integrating Museum Data, Citizen Science and Computer Vision”. In preparation. Poster at *2023 U-M Data Science and AI Summit*.
- [14] 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 at *Asia Pacific Conference of the Prognostics and Health Management Society 2023*.

\* denotes equal contribution.

## Technical Reports

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- [15] **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”. [\[bioRxiv\]](#). 2019.

## Grants

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- **NSF CISE Medium, Award # 2312842** 2023  
*Collaborative Research: RI: Medium: Principles for Optimization, Generalization, and Transferability via Deep Neural Collapse*,  
 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**

## Presentations

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### **Benign Overfitting and Grokking in ReLU Networks for XOR Cluster Data**

The Interplay between Learning, Optimization, and Statistics, 2023 INFORMS Annual Meeting.  
John Wright's group meeting (Sept 2023)

### **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). [\[Link\]](#)  
AI seminars at Boston University (Mar 2022).  
Misha Belkin's group meeting (Jan 2022).

### **Weston-Watkins Hinge Loss and Ordered Partitions**

RIKEN seminar on Learning theory of loss functions (Nov 2021)  
MCAIM Graduate Seminar, University of Michigan (Oct 2020)

### **Domain adaptation for spatial and dissociated gene expression data**

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

## Awards and Honors

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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	2019
NeurIPS 2019 Conference workshop: "Learning Meaningful Representations of Life"	
The Rollin M. Gerstacker Foundation Fellowship	2016
Dean's List	7 times
University Honors	4 times

## Teaching Experience

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**Group leader** Summer 2023

Midwest Research Experience for Graduates [\[link\]](#)

Advised four PhD students early in their programs on machine learning research over the course of two weeks.

**Group leader assistant** Summer 2022

Michigan Research Experience for Graduates [\[link\]](#)

Advised five PhD students early in their programs on machine learning research over the course of two weeks.

**Graduate student instructor** Winter 2021

University of Michigan, Ann Arbor, EECS 598 Statistical Learning Theory  
Received ECE GSI Honorable Mention for my teaching efforts.

**Guest lecturer**

Fall 2021

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.

**Teaching assistant**

Winter 2015 - Spring 2016

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.

**Professional Services**

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**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**

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**

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**Volunteer for Ann Arbor Meals on Wheels**

2022-2023

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