

# Mingyuan "William" Zhang

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## Summary

- Ph.D. student researcher working on **machine learning** and **artificial intelligence**.
- Conduct independent research on how to **design good algorithms with performance guarantees from first principles** for various machine learning problems.
- Methodologies include probability, statistics, machine learning, optimization, and programming.
- Produced **7** manuscripts (**6** of them as the lead author); published **5** of them in major machine learning and natural language processing conferences, including **top-tier** conferences such as **ICML**, **NeurIPS**, and **EMNLP**.
- Looking for **full-time job** opportunities to apply principled insights to solve impactful real-world problems in machine learning, data science, and/or quantitative research.

## Education

### Ph.D. in Computer and Information Science.

2018 - 2024 (Expected)

University of Pennsylvania, Philadelphia, Pennsylvania, USA

GPA: 4.00/4.00

- Advisor: Prof. Shivani Agarwal. Thesis: Statistical Machine Learning for Complex Classification Problems.

### B.S. in Honors Mathematics, Honors Statistics, Computer Science, and Data Science.

2018

University of Michigan, Ann Arbor, Michigan, USA

GPA: 3.92/4.00

- Highest Honors in Mathematics and Honors in Statistics.

## Research

### Statistical Machine Learning for Complex Classification Problems.

Aug. 2018 - Present

Design good algorithms with performance guarantees. Advised by Prof. Shivani Agarwal.

University of Pennsylvania

- Design algorithms from first principles for machine learning problems involving additional complexities beyond standard settings; these include multi-label classification, learning with noisy labels, weakly supervised learning, optimizing complex performance measures, classification with a specific function class, and others.
- Prove performance guarantees for the designed algorithms to show the performance improves with more data.
- Design and execute experiments using tools such as scikit-learn, TensorFlow, and PyTorch in order to validate the theories and benchmark the proposed algorithms against others.
- Produced 5 first-authored manuscripts; published 4 of them in major conferences on machine learning, including top-tier conferences such as ICML and NeurIPS.

### Foreseeing the Benefits of Incidental Supervision.

Nov. 2019 - June 2020

Measure the quality of incidental/weak supervision signals. Advised by Prof. Dan Roth.

University of Pennsylvania

- We proposed a unified measure to quantify the benefits of various incidental/weak signals for a given target task.
- We published this work in EMNLP 2021, a top-tier conference on natural language processing.

## Publications

### Multiclass Learning from Noisy Labels for Non-decomposable Performance Measures.

[Link]

Mingyuan Zhang, Shivani Agarwal.

In *Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024.

### Foreseeing the Benefits of Incidental Supervision.

[Link]

Hangfeng He, Mingyuan Zhang, Qiang Ning, Dan Roth.

In *Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2021.

### Learning from Noisy Labels with No Change to the Training Process.

[Link]

Mingyuan Zhang, Jane Lee, Shivani Agarwal.

In *Proceedings of the 38th International Conference on Machine Learning (ICML)*, 2021.

### Bayes Consistency vs. H-Consistency: The Interplay between Surrogate Loss Functions and the Scoring Function Class.

[Link]

Mingyuan Zhang, Shivani Agarwal.

In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. **Spotlight paper**.

## Convex Calibrated Surrogates for the Multi-Label F-Measure.

[Link]

Mingyuan Zhang, Harish G. Ramaswamy, Shivani Agarwal.

In *Proceedings of the 37th International Conference on Machine Learning (ICML)*, 2020.

## Consistent Multi-Label Learning from Noisy Labels.

Mingyuan Zhang, Shivani Agarwal.

Under review, 2024.

## On the Minimax Regret in Online Ranking with Top-k Feedback.

[Link]

Mingyuan Zhang, Ambuj Tewari.

Preprint, under review, 2023.

## Multiclass and Multi-Label Learning with General Losses.

H. G. Ramaswamy, M. Zhang, B. S. Babu, S. Agarwal, A. Tewari, R. C. Williamson.

In preparation.

## Skills

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<b>Programming Languages</b>	Python, C++, Matlab, R.
<b>Machine Learning Libraries</b>	scikit-learn, TensorFlow, PyTorch, Hugging Face, OpenAI API.
<b>Natural Languages</b>	English, Mandarin Chinese.

## Courses

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**Graduate level:** Real Analysis (A), Probability Theory (A), Discrete Stochastic Processes (A), Numerical Linear Algebra (A+), Combinatorial Theory (A+), Complex Variables (A), Applied Functional Analysis (A), Nonlinear Programming (A+), Statistical Inference (A), Linear Models (A), Analysis of Multivariate and Categorical Data (A), Statistical Learning (A), Time Series Analysis (A-), Machine Learning (A), Information Theory (A+), Statistical Signal Processing (A).

**Undergraduate level:** Intermediate Microeconomics Theory (A+), Intermediate Macroeconomics Theory (A), Game Theory (A+), Theoretical Statistics (A+), Statistical Computing Methods (A+), Numerical Methods (A+), Programming and Data Structures (A+), Data Structures and Algorithms (A+), Algorithms (A), Randomized Algorithms (A+), Database Management Systems (A), Computer Vision (A), Information Retrieval (A).

## Honors, Awards, Certificates

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2017-2018	<b>Outstanding Achievement in Mathematics Awards</b> , University of Michigan	USA
2023	<b>Deep Learning Specialization</b> , DeepLearning.AI	Coursera
2023	<b>DeepLearning.AI TensorFlow Developer Specialization</b> , DeepLearning.AI	Coursera
2023	<b>TensorFlow: Advanced Techniques Specialization</b> , DeepLearning.AI	Coursera
2023	<b>Natural Language Processing Specialization</b> , DeepLearning.AI	Coursera
2023	<b>Machine Learning Engineering for Production (MLOps) Specialization</b> , DeepLearning.AI	Coursera
2024	<b>Generative AI with Large Language Models</b> , DeepLearning.AI	Coursera

## Teaching & Service

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### Head Teaching Assistant — Machine learning.

Spring of 2020, 2021, 2022

CIS 520: A graduate-level machine learning course.

University of Pennsylvania

- Managed the TA team (~ 10 TAs) for a large class (~ 100 students) to help students learn effectively, held weekly office hours, made homework and exam questions, and administrated and graded exams.

### Grader — Various math courses.

2015 - 2018

Various linear algebra and probability courses.

University of Michigan

- Graded weekly assignments for six (undergraduate and graduate level) linear algebra and probability courses.

### Reviewers — Various machine learning conferences and journals.

2021 - 2024

NeurIPS, ICLR, AISTATS, JMLR, IEEE PAMI.

- Reviewed more than 30 machine learning manuscripts in total.