

RESEARCH STATEMENT I am an MD-PhD candidate advised by Osbert Bastani and James Gee. My research focuses on trustworthy machine learning and how we can reliably use ML systems under distribution shift. I am interested in intelligently leveraging prior knowledge and data to help algorithms better generalize to new distributions. I explore these problems in the setting of healthcare and AI4Science.

EDUCATION

University of Pennsylvania, MD-PhD Program
NIH F30 NRSA Fellow, HHMI-NIBIB Interfaces Fellow | 2021 - Present
Advised by [Osbert Bastani](#) and [James Gee](#)
Penn Engineering [Teaching Award](#) Recipient
MD-PhD, Bioengineering (in progress)
MSE, Computer Science (in progress)

California Institute of Technology
Salutatorian | 2017 - 2021
Advised by [Mikhail Shapiro](#)
BS, Applied Physics

EXPERIENCE

PhD Research Intern, [Genentech GenAI](#) South San Francisco, CA | 2025
Designed algorithms for discovering and evaluating personalized multi-drug combination therapies using LLMs as offline optimizers.

Human Frontier Collective Intern, [Scale AI](#) Remote | 2025
Developed complex, multi-step reasoning datasets for LLM training model and evaluation for code, math, and medical reasoning.

Health VC Fellow, [25madison](#) New York City, NY | 2024
Bridged clinical and engineering teams to help drive clinical operations for stealth healthtech incubation. Led exploratory investment research into digital health sectors.

AI Clinical Fellow, [Glass Health](#) Remote | 2023-2024
Released and assessed clinical guideline articles as knowledge sources for large language models (LLM). Investigated applications of LLMs for medical education.

Medical LLM Consultant, [Scale AI](#) Remote | 2023
Evaluated use cases of LLMs for healthcare. Red team-tested LLMs for accuracy and trustworthiness in real-world clinical workflows.

PhD Research Intern, [Microsoft Research](#) Redmond, WA | 2022
Developed ML methods for accelerated MRI imaging. Proposed novel techniques for better generalization of MRI image reconstruction models.

Software Engineer, [Hyperfine Research](#) Guilford, CT | 2021
Implemented and validated algorithms for more robust MRI signal acquisition and image post-processing in MR software across 25+ hospital sites.

SELECTED
PUBLICATIONS

- [1] **Yao MS**, Gee JC, Bastani O. Diversity by design: Leveraging distribution matching for offline model-based optimization. ICML. (2025). [Link](#)
- [2] Gee JC, **Yao MS**. Effective structured information extraction from chest radiography reports using open-weights large language models. Radiology (Editorial). (2025). [Link](#)
- [3] Wu Y, Liu Y, Yang Y, **Yao MS**, Yang W, Shi X, Yang L, Li D, Liu Y, Gee JC, Yang X, Wei W, Gu S. A concept-based interpretable model for the diagnosis of choroid neoplasias using multimodal data. Nature Communications. (2025). [Link](#)
- [4] **Yao MS**, Huang L, Leventhal E, Sun C, Stephen SJ, Liou L. Leveraging datathons to teach AI in undergraduate medical education: Case study. JMIR Med Educ 11:e63602. (2025). [Link](#)
- [5] **Yao MS**, Chae A, Kahn CE, Witschey WR, Gee JC, Sagreiya H, Bastani O. Evidence is all you need: Ordering imaging studies via language model alignment with the ACR Appropriateness Criteria. Under peer review. (2024). [Link](#)
- [6] **Yao MS**, Zeng Y, Bastani H, Gardner J, Gee JC, Bastani O. Generative adversarial model-based optimization via source critic regularization. NeurIPS. (2024). [Link](#)
- [7] Yang Y, Gandhi M, Wang Y, Wu Y, **Yao MS**, Callison-Burch C, Gee JC, Yatskar M. A textbook remedy for domain shifts: Knowledge priors for medical image analysis. NeurIPS (Spotlight). (2024). [Link](#)
- [8] Chae A†, **Yao MS**†, Sagreiya H, Goldberg AD, Chatterjee N, MacLean MT, Duda J, Elahi A, Borthakur A, Ritchie MD, Rader D, Kahn CE, Witschey WR, Gee JC. Strategies for implementing machine learning algorithms in the clinical practice of radiology. Radiology. (2024). [Link](#)
- [9] **Yao MS**†, Chae A†, MacLean MT, Verma A, Duda J, Gee JC, Torigian DA, Rader D, Kahn CE, Witschey WR, Sagreiya H. SynthA1c: Towards clinically interpretable patient representations for diabetes risk stratification. PRIME MICCAI. (2023). [Link](#)
- [10] **Yao MS**, Hansen MS. A path towards clinical adaptation of accelerated MRI. Proc ML4H. (2022). [Link](#)

TEACHING

Instructor and Curriculum Lead, Ethical Algorithms for the Modern Clinician | [Link](#)
TA, Distributed Systems (CIS 5050, Penn) | Spring 2025
TA, Principles of Deep Learning (ESE 5460, Penn) | Fall 2024
TA, Imaging Informatics (EAS 5850, Penn) | Spring 2024, Summer 2024
Head TA, Healthcare and Technology (CIS 7000, Penn) | Fall 2023, Fall 2024
TA, Diagnostic Ultrasound for Medical Students (Penn) | 2023 - Present
TA, Pre-Clinical Medicine (Penn) | 2023 - Present
Head TA, Applied Mathematics (ACM 95a, Caltech) | Winter 2021
TA, Graduate Classical Physics (Ph 106a, Caltech) | Fall 2020
TA, Applied Mathematics (ACM 95b, Caltech) | Spring 2020
TA, Quantum Physics (Ph 12b, Caltech) | Winter 2020
TA, Electrodynamics and Magnetism (Ph 1c, Caltech) | Spring 2019
TA, Operating Systems (CS 24, Caltech) | Spring 2019
TA, Waves and Oscillations (Ph 12a, Caltech) | Fall 2019
TA, Electrodynamics and Magnetism (Ph 1c, Caltech) | Spring 2019
TA, Special Relativity and Electrostatics (Ph 1b, Caltech) | Winter 2019

SERVICE

Referee

RSNA Radiology

RSNA Radiology: Artificial Intelligence

AMIA Annual Symposium

Neural Information Processing Systems (NeurIPS)

International Conference on Learning Representations (ICLR)

International Conference on Machine Learning (ICML)

AHLI Conference on Health, Inference, and Learning (CHIL)

Ongoing

Anti-Racism Curriculum Lead, Medical Education, University of Pennsylvania SOM

AI Curriculum Task Force Member, University of Pennsylvania SOM

Board Member, Radiology Interest Group, University of Pennsylvania SOM

Admissions Committee, University of Pennsylvania SOM

Peer Tutor, University of Pennsylvania SOM

Technology Committee Vice-Chair, [American Physician Scientists Association](#)

Director of Data Science & AI, [MDplus](#)

Peer Mentor, University of Pennsylvania [Step-Ahead Mentorship Program](#)

Prior Service

Editor-in-Chief, [Caltech Undergraduate Research Journal](#)

Volunteer Tutor, [Caltech RISE Tutoring Program](#)

Peer Tutor, Caltech Deans' Office

Student Body Representative, [Caltech Academics and Research Committee](#)