MICHAEL YAO michaelsyao.com michael.yao@pennmedicine.upenn.edu

RESEARCH STATEMENT

My research focuses on trustworthiness and robustness for deep learning, offline optimization, meta-learning, and bandit problem formulations. I am broadly interested in developing methods that leverage prior knowledge to help algorithms better generalize to new distributions. I explore these problems in the setting of generative design, AI4Science, minority health disparities, and medical imaging.

EDUCATION

University of Pennsylvania, MD-PhD Program
NIH F30 NRSA Fellow, HHMI-NIBIB Interfaces Fellow | 2021 - Present
Advised by Osbert Bastani and James Gee
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

Health VC Fellow, 25madison
New York City | February 2024 - June 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 | November 2023 - Present
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 | June 2023 - August 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 | June 2022 - August 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 | May 2021 - August 2021
Implemented and validated algorithms for more robust MRI signal acquisition and image post-processing in MR software across 25+ hospital sites.

PUBLICATIONS

[1] **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

[2] **Yao MS**, Zeng Y, Bastani H, Gardner J, Gee JC, Bastani O. Generative adversarial model-based optimization via source critic regularization. NeurIPS. (2024). 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. arXiv Preprint. (2024). Link

[4] 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

[5] 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

[6] **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

[7] **Yao MS**, Hansen MS. A path towards clinical adaptation of accelerated MRI. Proc ML4H. (2022). Link

[8] Suzuki S, Chosa K, Barillà C, **Yao MS**, Zuffardi O, Kai H, Shuto T, Suico MA, Kan YW, Sargent RG, Gruenert DC. Seamless gene correction in the human cystic fibrosis transmembrane conductance regulator locus by vector replacement and vector insertion events. Frontiers in Genome Editing. (2022). Link

[9] Abedi MH†, **Yao MS**†, Mittelstein DR, Bar-Zion A, Swift MB, Lee-Gosselin A, Barturen-Larrea P, Buss MT, Shapiro MG. Ultrasound-controllable engineered bacteria for cancer immunotherapy. Nat Commun. (2022). Link

[10] **Yao MS**, Uhr L, Daghlian G, Amrute JM, Deshpande R, Mathews B, Patel SA, Henri R, Liu G, Reierson K, Johnson G. Demonstration of a longitudinal medical education model (LMEM) to teach point-of-care ultrasound in resource-limited settings. POCUS Journal. (2020). Link

[11] Maw AM, Galvin B, Henri R, **Yao MS**, Exame B, Fleshner M, Fort MP, Morris MA. Stakeholder perceptions of point-of-care ultrasound implementation in resource-limited settings. Diagnostics. (2019). Link

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TEACHING

Instructor and Curriculum Lead, Ethical Algorithms for the Modern Clinician | Link
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

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