

Jeffrey J. Ma

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RESEARCH INTERESTS

I am interested in problems that lie at the intersection of computer science with other fields, such as political science, game theory or medical imaging. My current focuses are on the following:

- Competitive optimization methods and their robustness over traditional single-agent methods.
- Fast algorithms that balance efficiency and accuracy.
- Multi-agent games that demonstrate pitfalls of current optimization algorithms.

EDUCATION

California Institute of Technology (Caltech)

Pasadena, CA

- B.S. in Computer Science and Business, Economics, & Management (BEM). Expected graduation in June 2022.
- GPA: 4.2/4.3.

Sept 2018 – Present

RESEARCH EXPERIENCE

Tensor Lab, California Institute of Technology Undergraduate Researcher

Pasadena, CA

August 2020 – Present

- Undergraduate researcher at the Tensor Lab, extending and formalizing competitive gradient descent optimization methods to multi-agent, reinforcement learning environments and real-world multiplayer games.
- Currently working on a multi-agent optimization package and training framework to competitively train robust agents for multi-player games using novel competitive methods.
- Advisors: Prof. Animashree Anandkumar, Prof. Yuanyuan Shi, Prof. Florian Schäffer

Magnetic Resonance Systems Research Laboratory, Stanford University Summer Undergraduate Research Fellowship (SURF)

Stanford, CA

June 2019 – Dec 2019

- Selected for a SURF at the Magnetic Resonance Systems Research Laboratory (MRSRL). Developed a machine learning framework to detect motion artifacting in pediatric MRI and provide data informed suggestions to MR technicians, a solution which reduces the inefficient use of high-cost doctor hours on image quality assessment.
- Studied convolutional and complex-valued neural networks and created a framework for evaluating the performance over different model architectures and training label distributions.
- First-authored a paper accepted to the 2020 IEEE International Symposium on Biomedical Imaging (ISBI). Received full funding through the Hummel-Gray and Housner Funds to attend ISBI.
- Advisors: Prof. Shreyas Vasanawala, Prof. Ukash Nakarmi

The Wall Lab, Stanford University Research Intern

Stanford, CA

June 2017 – July 2018

- Selected for the Stanford Institute of Medical Research Summer Research Program (SIMR). Worked as a Research Intern at The Wall Lab to develop a machine-learning classifier for diagnosing Autism Spectrum Disorder based on a patient's ability to recognize emotion and their level of facial engagement in a controlled wearable device test setting.
- Published research paper to the Journal of Medical Internet Research (JMIR).
- Advisors: Prof. Dennis P. Wall, Prof. Nick Haber

INDUSTRY EXPERIENCE

Citadel, Electronic Trading Team Quantitative Developer Intern

New York, NY

June 2021 – August 2021

- Intern on the asset manager side at Citadel, working on the Electronic Trading (E-Trading) team under Global Fixed Income (GFI). The E-Trading team focuses on algorithmic and automated methods of trading and booking fixed income instruments.
- Supervisors: Trevor Middleton, Colin Jennings

Nuro, Machine Learning Infrastructure Team
Software Engineering Intern

Mountain View, CA
March 2021 – June 2021

- Intern at Nuro, an early-stage, self-driving commercial delivery startup, focused on accelerating the benefits of robotics for everyday life. Worked on ML infrastructure and model optimization and deployment.
- Supervisors: Timothy Chou, Hongze Zhao, Jack Guo

Google Brain, Tensorflow Extended Team
Software Engineering Intern

Mountain View, CA
June 2020 – Sept 2020

- Worked on the TensorFlow Extended (TFX) team in Google Brain (Google’s research division). Contributed to TFX, an end-to-end platform for automatically deploying machine learning (ML) models in production.
- Implemented component and architecture improvements to enable asynchronous component execution and continuous pipeline architecture (ML pipelines that can periodically run and stay updated on windows of continually arriving batches of data), and prototyped native support for data streaming sources in TFX.
- Supervisors: Jiayi Zhao, Ruoyu Liu

TEACHING
EXPERIENCE

CS24: Computing Systems

Caltech

Head Teaching Assistant (Fall 2020, 2021), Teaching Assistant (Fall 2019)

2019 – Present

- Head TA for Caltech’s CS24 (Computing Systems), which focuses on a programmer’s view of how computer systems execute programs, store information, and communicate. Topics include: machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, memory organization and management, and supporting concurrent computation.

CS2: Introduction to Programming Methods
Teaching Assistant (Winter 2021, Winter 2020)

Caltech

2020 – Present

- TA for Caltech’s CS2 (Introduction to Programming Methods). Topics include data structures; implementation and performance analysis of fundamental algorithms; algorithm design principles, in particular recursion and dynamic programming.

SKILLS

Programming Python, Java, C/C++, MATLAB, L^AT_EX, OCaml, Haskell, x86-64 Assembly
Frameworks: PyTorch, TensorFlow, sklearn, NumPy, Flask, Apache Beam, Google Cloud
Other: Git, macOS, Linux
Spoken Languages: English (native proficiency), Mandarin (working proficiency)

PUBLICATIONS

Complete List: Google Scholar [JemYiGEAAA] · ORCID [0000-0002-3646-3547]

1. **J. J. Ma**, U. Nakarmi, C. Yue Sik Kin, C. Sandino, J. Y. Cheng, A. B. Syed, P. Wei, J. M. Pauly, and S. Vasanaawala, “Diagnostic image quality assessment and classification in medical imaging: Opportunities and challenges,” *Proceedings of the 2020 IEEE 17th International Symposium on Biomedical Imaging (ISBI)*, pp. 337–340, May 2020, Full Paper.
2. A. Nag, N. Haber, C. Voss, S. Tamura, J. Daniels, **J. J. Ma**, B. Chiang, S. Ramachandran, J. Schwartz, T. Winograd, C. Feinstein, and D. P. Wall, “Toward continuous social phenotyping: Analyzing gaze patterns in an emotion recognition task for children with autism through wearable smart glasses,” *Journal of Medical Internet Research (JMIR)*, vol. 22, no. 4, Apr. 2020, Journal Paper.

PRESENTATIONS

1. **J. J. Ma**, U. Nakarmi, C. Yue Sik Kin, J. Y. Cheng, C. Sandino, A. B. Syed, P. Wei, J. M. Pauly, and S. Vasanaawala, “Analysis of deep learning models for diagnostic image quality assessment in magnetic resonance imaging,” *Proceedings of the 2020 28th International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting*, Aug. 2020, Abstract/Poster Presentation.

- AWARDS**
- Jack E. Froehlich Memorial Award (*awarded to a Caltech junior in the upper 5 percent of their class who shows outstanding promise for a creative professional career*) 2021
 - Patrick Hummel and Harry Gray Travel Fund Award 2020
 - George W. Housner Student Discovery Fund Award 2020
 - SCIAC Swimming Championship Finalist (top-16) in the 100 and 200 yd. Breaststroke 2020
 - Gee Family Poster Competition Finalist (for excellence in scientific communication) 2019
 - SURF Fellowship 2019
 - Andy Grove Scholarship 2019
 - SCIAC Swimming Championship Finalist (top-16) in the 100 and 200 yd. Breaststroke 2019
 - National Merit Scholarship 2018

OTHER ACTIVITIES

Caltech Varsity Swim Team Fall 2018 – Present

- Collegiate student-athlete competing at the NCAA Division 3 level against schools in the Southern California Intercollegiate Athletics Conference (SCIAC); 4-Time SCIAC Swimming Championship Finalist in the 100-yd and 200-yd Breaststroke and 2-Time SCIAC All-Academic team member.

Caltech Student Faculty Program (SFP) Ambassador Summer 2020 – Present

- Nominated by campus leadership to serve as a SURF Ambassador, spearheading the SFP Office's efforts to make Caltech a welcoming virtual environment for all incoming summer research students. Responsibilities included organizing weekly check-ins, social and networking events, and assisting summer research students with any logistical issues.

Caltech Admissions Ambassador and Campus Tour Guide Spring 2020 – Present

- Selected by the admissions office as a campus representative. Lead campus tours and held informational office hours for prospective students and families.

Fleming House Treasurer Spring 2021 – Present

- Elected as Treasurer for Fleming House, one of Caltech's eight undergraduate houses. Managed and allocated member dues and house endowment for social activities and student welfare.

Caltech Frosh Camp Counselor and Deans Tutor Fall 2019 – Present

- Selected by the Deans' Offices to help organize freshmen orientation and lead a pod of incoming freshmen. Lead orientation events and serving as an intermediary between new students and campus resources.
- Tutored peer undergraduates in a variety of applied math and computer science courses.

Caltech Interhouse Athletics Manager Fall 2019 – Spring 2021

- Organizing and scheduling social, intramural athletics competitions between Caltech's eight undergraduate houses. Member of Fleming House's Athletics Team, organizing house intramural athletics participation and events.