

HAOXUAN (STEVE) CHEN

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EDUCATION

California Institute of Technology

October 2018 - Present

Senior Undergraduate (Information and Data Sciences & Mathematics)

Overall GPA: 4.3/4.3

- **Major/Department advisor:** Prof. Yisong Yue & Prof. Dinakar Ramakrishnan
- **Research advisor:** Prof. Andrew M. Stuart
- **Selected coursework:** numerical linear algebra and numerical PDE, real and complex analysis, functional analysis, optimization, probability and stochastic processes, statistical inference, machine learning (deep learning, reinforcement learning, learning theory), computer vision, algorithms, combinatorics and discrete mathematics, abstract algebra, topology, differential geometry
- **Research statement:** My current research focuses on the intersection of applied mathematics, data science, statistics and machine learning. In particular, I am interested in using ideas from statistics, optimization, mathematical analysis, and differential equations to develop robust, explainable and theoretically guaranteed machine learning models for discovering physical laws and solving problems in engineering.

RESEARCH EXPERIENCE

Uncertainty Quantification Group, Massachusetts Institute of Technology

Class of '36 SURF Fellow

June 2021 - Present

- Project: Learning High-Dimensional Non-Gaussian Graphical Models via Neighborhood Selection
- Mentors: Ricardo Baptista (Ph.D Student), Prof. Rebecca E. Morrison, Prof. Youssef M. Marzouk
- Developed a localized version of the SING (Sparsity Identification in NonGaussian distributions) algorithm via neighborhood selection methods. Tested the localized SING algorithm's performance on several high-dimensional distributions.

Institute for Computational and Mathematical Engineering, Stanford University

Visiting Researcher (Online)

June 2021 - Present

- Project: Convergence Rate of Neural PDE Solvers
- Mentors: Yiping Lu (Ph.D Student), Prof. Jianfeng Lu, Prof. Lexing Ying
- Studied the statistical limits of Deep Ritz Method (DRM) and Physics Informed Neural Networks (PINN) for solving a class of high-dimensional PDEs. Established upper and lower bounds for the accuracies of both DRM and PINN.

Department of Computing and Mathematical Sciences, California Institute of Technology

SURF Fellow (Online)

June 2020 - August 2020

- Project: Continuous Time Opinion Formation on a Graph
- Mentors: Bamdad Hoessini (Von Karman Instructor), Prof. Andrew M. Stuart.
- Studied unsupervised and semi-supervised learning algorithms and spectral graph clustering. Applied these techniques to analyze how people's opinions vary under the influence of a communication network.

Department of Mathematics, California Institute of Technology

Morgan Ward SURF Fellow

June 2019 - August 2019

- Project: Properties of Quaternionic Automorphic Forms.

- Mentor: Zavosh Amir-Khosravi (Olga Taussky John Todd Instructor).
- Developed an analogue of automorphic forms for quaternions. Explored a concept called " n -Regularity", which corresponds to holomorphicity in the classical case.

PUBLICATION

1. Yiping Lu, Haoxuan Chen, Jianfeng Lu, Lexing Ying, Jose Blanchet. **Paper on convergence rate of neural PDE solvers (a different title)**, *in submission, 2021*.

TEACHING EXPERIENCE

California Institute of Technology
Teaching Assistant

October 2019 - Present
Math/Applied Math courses

- ACM/CMS 117: Probability Theory and Stochastic Processes (Graduate level), Fall 2021.
- ACM 11: Introduction to Matlab and Mathematica (Undergraduate level), Spring 2021.
- ACM/IDS 104: Applied Linear Algebra (Undergraduate level), Fall 2020.
- ACM 11: Introduction to Matlab and Mathematica (Undergraduate level), Spring 2020.
- Math 2: Differential Equations (Undergraduate level), Fall 2019.

Ross Mathematics Program, The Ohio State University
Junior Counselor

June 2018 - July 2018
Number Theory

- Participated in the highly selective math summer program as a first-year student in 2017. Returned to the program as a teaching assistant in 2018.
- Attended daily lectures and seminars and dorm lectures (topics include analysis, algebra and topology).
- Graded first-year students' solutions to the problem sets and gave them feedback.

HONORS AND AWARDS

William Lowell Putnam Mathematical Competition, 114- <i>th</i> in overall ranking	2019.12
William Lowell Putnam Mathematical Competition, 120- <i>th</i> in overall ranking	2018.12
Harvard-MIT Math Tournament (HMMT), 20- <i>th</i> in individual ranking	2016.11
Princeton University Mathematics Competition (PUMaC), 7- <i>th</i> in individual ranking	2016.11
American Invitational Mathematics Exam (AIME 2), 13 out of 15 points, USAMO Qualifier	2016.3

TECHNICAL STRENGTHS AND TEST SCORES

Computer Languages	Python, MATLAB, Mathematica, Java
Software & Tools	LaTeX, Microsoft Word, Excel, PowerPoint
Languages	English, Mandarin
American College Test (ACT)	Composite score: 35/36
TOEFL Test	Composite score: 110/120