

# Kai Yuanqing Xiao

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## EDUCATION

### Massachusetts Institute of Technology - Computer Science and Artificial Intelligence Lab

Pursuing a Ph.D. in Computer Science, with a focus on Theoretical Computer Science and Machine Learning

Advisor: Aleksander Madry

Cambridge, MA

2017-Present

### Massachusetts Institute of Technology

M.Eng. Degree - Master's Thesis on "Cookie Clicker" under the guidance of Erik Demaine

B.S. Degree - Double Major in Computer Science and Mathematics; GPA: 5.0/5.0

Coursework: 6.854 (Advanced Algorithms), STAT 210 (Probability Theory), 6.438 (Algorithms for Inference), 6.869 (Computer Vision), 6.840 (Complexity Theory), 6.172 (Performance Engineering)

Cambridge, MA

2017-2018

2013-2017

### Oxford University

Visiting Student in Mathematics at St. Peter's College

Coursework: Machine Learning, Networks

Oxford, UK

Jan.-June 2016

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## RESEARCH

### "Training for Faster Adversarial Robustness Verification via Inducing ReLU Stability"

2018

Kai Xiao, Vincent Tjeng, Nur Muhammad (Mahi) Shafiullah, Aleksander Madry. (<https://arxiv.org/abs/1809.03008>)

- Explored co-designing neural networks to be both robust and easily verifiable
- Developed regularization technique for encouraging ReLU Stability, allowing for faster verification

### "Evaluating Robustness of Neural Networks with Mixed Integer Programming"

2018

Vincent Tjeng, Kai Xiao, Russ Tedrake. (<https://arxiv.org/abs/1711.07356>)

- Supported by providing adversarial-training baselines for evaluations of robustness

### "Cookie Clicker" - Master's Thesis

2018

Erik Demaine, Hiro Ito, Stefan Langerman, Jayson Lynch, Mikhail Rudoy, Kai Xiao. (<https://arxiv.org/abs/1808.07540>)

*Oral Presentation at the 20<sup>th</sup> Japan Conference on Discrete and Computational Geometry, Graphs, and Games.*

- Analyzed optimal strategies for incremental games like Cookie Clicker
- Discovered NP-Hardness results, dynamic programming solutions, and approximation algorithms

### Neural Connectivities Analysis (with Shafira Goldwasser)

2016

- Analyzed neural connectivities dataset using spectral clustering and community graph model

### "Online Algorithms Modeled after Mousehunt" - Final Project for 6.854 (Advanced Algorithms)

2014

Jeffrey Ling, Kai Xiao, Dai Yang. (<https://arxiv.org/abs/1501.01720>)

- Studied Markov Decision Processes, randomized online algorithms, and competitive ratios applied to the game
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## AWARDS

• NSF Graduate Research Fellowship Program (GRFP) Award

2018

• Top 200 in William Lowell Putnam Mathematical Competition

2014

• Qualified 4 times for USA Math Olympiad; Honorable Mention (top 24 out of over 100,000) in 2012, top 50 in 2011

2010-2013

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## WORK EXPERIENCES

### Teaching Assistant for 6.046 (Design and Analysis of Algorithms) at MIT

Boston, MA

- Taught weekly classes, held twice-a-week office hours, wrote problem set and exam questions for two academic semesters

2016-2017

### Citadel

Chicago, IL

*Summer Quantitative Research Analyst*

Summer 2016

- Used text mining and sentiment analysis on a unique dataset to construct predictive signal for stock prices
- Improved the data processing pipeline and evaluated changes using characteristic portfolios and simulations

### D.E. Shaw & Co.

New York City, NY

*Quantitative Analyst / Software Development Intern*

Summer 2015

- Created mathematical models for the behavior of specific types of trades based on market conditions
- Used vectorized operations in NumPy to analyze large amounts of historical data

### A9 (Product Search Team)

Palo Alto, CA

*Software Development Engineer Intern*

Summer 2014

- Worked with Apache Hadoop and Apache Pig to perform map-reduce tasks
- Generated and logged statistical metrics related to Amazon's product search rankings
- Mined Twitter data for trending music and showed related items available on Amazon (side project)

**Jane Street Capital***Assistant Trader*

New York City, NY

January 2014

- Modeled stock market behavior through analysis of historical and recent financial data

**Stanford University Chemistry Department; Bianxiao Cui, Ph.D.***Data Analysis Intern*

Stanford, CA

July-Aug. 2012

- Processed images of protein movement across axons; traced curves in images using MATLAB program
  - Improved functionality of MATLAB curve-tracing program after learning the language from scratch
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**LEADERSHIP EXPERIENCE****MIT TechX***Director of Corporate Relations*

2014-2015

- Leader of student group that communicated with companies to sponsor and exhibit their technologies at MIT's annual xFair
- Worked with other executive board members to run events that expose MIT students to interesting technology