

Yuan (Charles) Cui

CONTACT INFORMATION

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EDUCATION

Bachelor of Arts, Oberlin College Expected Graduation: May 2020
Major: Mathematics and Computer Science
GPA: 4.11

Budapest Semesters in Mathematics February 2019 - May 2019

RESEARCH INTERETS

RESEARCH EXPERIENCE

Applied Mechanism Design - Perceived Fairness in The School Choice System August 2019 - Present
Oberlin College (Computer Science Honors Thesis Project) *Oberlin, OH*

- Conducting a literature review of the school choice problem with a focus on fairness and how algorithms perform in experiments and real life. Studying how modifications of the Deferred Acceptance algorithm can increase perceived fairness while preserving a near-maximum total payoff and strategy-proofness. Designing an experiment with human participants to test my hypotheses.

Machine Learning for Advance Healthcare Directives June 2019 - August 2019
REU - Combinatorics and Algorithms for Real Problems (CAAR) *College Park, MD*

- (Collaboration with John Dickerson, Samuel Dooley, Kendra Griesman, Duncan McElfresh, Neil Sehgal, Weiqin Wang, and Tyler Will.) Developed a machine learning model for advance healthcare directives. Deployed various active learning algorithms to dynamically select survey questions based on patients' previous responses and built machine learning algorithms for inference. Developing a website to collect data. Coauthored a paper, which is accepted to the Health Intelligence workshop of AAAI-2020.

Privacy, Equilibrium, and Robustness June 2018 - Present
Oberlin College *Oberlin, OH*

- (Collaboration with Rachel Cummings, Ezra Goss, and Samuel Taggart.) Analyzed a repeated pricing game between a buyer and seller in the presence of privacy and the absence of commitment power. Conducted preliminary numerical experiments and solved for equilibrium in the game by hand to gain an intuition and overview about how equilibria behave and formalized results about the effect of privacy in our repeated sales setting. Planning to submit to EC '20 (ACM Conference on Economics and Computation).

An Infinite Hidden Markov Model with Similarity-Biased Transitions July 2017 - December 2017
Oberlin College *Oberlin, OH*

- Worked with Professor Colin Dawson on a machine learning research project, which is an extension of the model in his paper published at ICML 2017. Experimented with replacing a C++ implementation of a Hidden Markov Model with Python and found negligible gains. Joined a bootcamp led by professors and graduate students at The University of Arizona to learn C++ and how to work with the KJB library and the Interdisciplinary Visual Intelligence Laboratory (IVILAB). In the fall, studied the Hierarchical Dirichlet Process Hidden Markov Model (HDP-HMM) built by Professor Dawson and his collaborators. Added more documentations in the code base and learned how to run experiments in Python.

RELEVANT COURSEWORK

Mathematics and Statistics

- FYSP 074: Cryptography
- MATH 232: Linear Algebra
- MATH 301: Foundations of Analysis
- MATH 317: Number Theory
- MATH 327: Algebra I: Group Theory
- MATH 331: Linear Optimization
- MATH 353: Topology
- MATH 550H: Machine Learning Research
- MATH 995H: Primality Testing
- MATH 995H: Numerical Analysis
- STAT 339: Probabilistic Modeling and Machine Learning

Courses in Budapest Semesters in Mathematics

- CO1: Combinatorics 1
- GMT: Game Theory
- PRO: Probability Theory

Computer Science

- CSCI 150: Introduction to Computer Science
- CSCI 151: Data Structures
- CSCI 210: Introduction to Computer Architecture (*Spring 2020*)
- CSCI 241: Systems Programming
- CSCI 275: Programming Abstractions
- CSCI 280: Algorithms
- CSCI 365: Advanced Algorithms
- CSCI 383: Theory of Computation (*Spring 2020*)
- CSCI 385: Economics and Computation

TEACHING ASSISTANTSHIPS

Dedicated Tutor for Math 220

Oberlin College

September 2019 - Present

Oberlin, OH

- Tutoring Calculus I, Calculus II, Discrete Mathematics, Linear Algebra, Chemistry and the Environment during drop-in hours for approximately 3 hours per week.

Quantitative Skills Center Tutor

Oberlin College

September 2019 - Present

Oberlin, OH

- Tutoring Calculus I, Calculus II, Discrete Mathematics, Linear Algebra, Chemistry and the Environment during drop-in hours for approximately 3 hours per week.

Tutor at Student Academic Success Programs*Oberlin College*

November 2018 - Present

Oberlin, OH

- MATH 134: Calculus II (2 tutees, Fall 2019)
- MATH 220: Discrete Mathematics (1 tutee, Fall 2019)
- ECON 206: Principles of Finance (2 tutees, Fall 2019)
- CSCI 150: Introduction to Computer Science (1 tutee, Fall 2018)

Mathematics and Computer Science Department Grader*Oberlin College*

February 2017 - May 2018

Oberlin, OH

- MATH 220: Discrete Mathematics (Spring 2018)
- CSCI 150: Introduction to Computer Science (Fall 2017)
- MATH 232: Linear Algebra (Spring 2017, Fall 2017)

OWLS (The Oberlin Workshop and Learning Sessions) Leader*Oberlin College*

February 2017 - May 2018

Oberlin, OH

- Served as an OWLS leader for MATH 132 (Calculus Ib: Integration and Applications). Attended lectures, drafted worksheets of problems and practice exams, and held 90-minute problem sessions twice a week.

Computer Science Department Lab Helper*Oberlin College*

February 2017 - May 2017

Oberlin, OH

- Worked in the computer lab every Saturday to help students with their lab assignments.

OTHER EXPERIENCE

The Engage Undergraduate Investment Conference*University of Michigan - Ann Arbor*

October 2018

Ann Arbor, MI

- Used a machine learning algorithm to select stocks and pitched a stock at the conference.

Thematic Program on Geometric Representation Theory and Symplectic Varieties*University of Notre Dame - Center for Mathematics at Notre Dame*

June 2018

Notre Dame, IN

- Attended a week of lectures and problem sessions.

Communications Intern*Bamboo Bicycles Beijing & Beyond*

December 2017 - January 2018

Beijing & Shanghai, China

- Interviewed six former volunteers, workshop participants, and employees from *Bamboo Bicycles Beijing & Beyond* on maker creativity and the environment. Published articles about interviewees in both Chinese and English on my WeChat Official Account.

TALKS GIVEN

Celebration of Undergraduate Research*Oberlin College*

November 2018

Oberlin, OH

- Presented my summer research to a general audience.

PROGRAMMING SKILLS

Python, R, Mathematica, Scheme, \LaTeX .**AWARDS AND GRANTS**

Oberlin Shansi In-Asia Grant*Oberlin Shansi*

November 2019

- Awarded a total of \$750 for my summer project *Nightclubs for Literature: Bookstore Culture in Taiwan*.

Elbridge P. Vance Scholar of Mathematics
Oberlin College

July 2016 - May 2020

- Awarded a total of \$29,879 in my four years at Oberlin College.

Winter Term Individual Project Grant
Oberlin College

January 2018

- Awarded \$300 to fund my winter term project in 2018 with Bamboo Bicycles Beijing & Beyond.

VOLUNTEERING

Translator at Khan Academy

September 2018 - November 2018

Khan Academy

- Translated mathematics and statistics exercises from English to Mandarin every week.

Teacher and Volunteer

January 2017

Maya Universe Academy

Damauli, Nepal

- Volunteered at Maya Universe Academy, the only tuition-free private school in Nepal, for three weeks. Taught Chinese Language and Culture as well as Logic and Paradox. Also tutored mathematics.

ORGANIZATIONS

Mathematics Majors Committee

September 2016 - December 2018

Oberlin College

Oberlin, Ohio

- Facilitated the Math Majors T-shirt design and organized a post-graduation plans session with the Career Development Center for the majors. Hosted weekly Math Tea with other members of the committee.

Mathematical Association of America

September 2017 - Present

Oberlin College

Oberlin, Ohio

Oberlin College Finance and Investment Club

September 2018 - December 2018

Oberlin College

Oberlin, Ohio

- Attended weekly meetings and participated in discussions on investment decisions.