Yuan (Charles) Cui

CONTACT INFORMATION

Email: charlescui@u.northwestern.edu
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EDUCATION

Ph.D. in Computer Science, Northwestern University — Expected Graduation: Jun 2025
Advisors: Jason Hartline, Matthew Kay

Bachelor of Arts, Oberlin College — May 2020
Majors: Mathematics and Computer Science
Mentors: Jack Calcut, Benjamin Linowitz, Samuel Taggart

Budapest Semesters in Mathematics — Spring 2019

RESEARCH INTERESTS

Algorithms, Data Science, Data Visualization, Economics and Computation

PUBLICATIONS

· McElfresh, DC, S Dooley, **Y Cui**, K Griesman, W Wang, T Will, N Sehgal, and JP Dickerson (2020). Can an Algorithm be My Healthcare Proxy? In: Workshop on Health Intelligence at AAAI-20 & Explainable AI in Healthcare and Medicine. Ed. by A Shaban-Nejad, M Michalowski, and DL Buckeridge. Springer 2020.

RESEARCH PROJECTS

Assessing Critical Thinking in Visualization Interpretation — Apr 2022 - Present
Northwestern University — *Evanston, IL*

· (Collaboration with Matthew Kay and Lily Ge.) Developing a test to measure people's ability to identify, interpret, and reason about misleading and erroneous visualizations. Submitting to ACM CHI 2023.

Mechanism Design with Inequality — Jun 2021 - Present
Northwestern University — *Evanston, IL*

· (Collaboration with Jamie Morgenstern, Samuel Taggart, and Matthew vonAllmen.) Building mathematical models for resource allocation with the assumption that people have different values for money, time, and social service. Designing auction mechanisms that can allocate the resources to those who value social services the most (vulnerable populations). Creating a Python program that uses linear programming solver to find equilibria of this model.

Peerpal Peer Grading Platform — Jan 2022 - Jun 2022
Northwestern University — *Evanston, IL*

· Led a team of six undergraduate students for software development and maintenance under the supervision of Professor Jason Hartline. Conducted UI and data visualization research to improve students', teaching assistants', and instructors' interaction with the platform.

Applied Mechanism Design - Perceived Fairness in The School Choice System Sep 2019 - Apr 2020
Oberlin College *Oberlin, OH*

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

Machine Learning for Advance Healthcare Directives Jun 2019 - Aug 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. Developed a prototype website to collect data. Coauthored a paper, which was accepted to the Health Intelligence workshop of AAAI-2020.

Privacy, Equilibrium, and Robustness Jun 2018 - Feb 2019
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 numerical experiments using Mathematica and solved for equilibrium in the game. Formalized results about the effect of privacy in our repeated sales setting.

Infinite Hidden Markov Model Jul 2017 - Dec 2017
Oberlin College *Oberlin, OH*

· Implemented Hidden Markov Models (HMMs) in Python and C++ to compare their efficiency. 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). Studied the Hierarchical Dirichlet Process Hidden Markov Model (HDP-HMM) built by Professor Colin Dawson (*Oberlin College*), Professor Clayton Morrison (*The University of Arizona*), and Chaofan Huang (*Georgia Tech*) and added more documentations in the code base. Learned how to run experiments in Python.

PROFESSIONAL EXPERIENCE

Fellow May 2022 - Aug 2022
Data Science for Social Good & Carnegie Mellon University *Pittsburgh, PA*

· Built a machine learning system to improve the routing of the 988 National Suicide Prevention Lifeline which serves 2,000,000 callers per year. Obtained preliminary results that could help 20,000 more callers per year upon validation.
· Planning to submit to ACM KDD 2023.

Co-founder, Head of Data Science Jan 2021 - Oct 2021
HomeRiser, Inc.

· Co-founded a real estate technology start-up that uses a novel business model powered by data science to provide more flexible and affordable ways to finance people's home ownership. Developed a financial model in Python that simulated cash flow and generated a detailed profit and losses statement. Directed the data science team to identify target markets and designed pricing strategies by leveraging data and algorithms.

TEACHING

Northwestern University Sep 2021 - Present
Teaching Assistantships *Evanston, IL*

· COMP_SCI 212: Mathematical Foundations of Computer Science (Winter 2022)

· COMP_SCI 336: Design & Analysis of Algorithms (Fall 2021)

AWARDS AND GRANTS

Northwestern University Department of Computer Science Fellowship Sep 2020 - Aug 2021
Northwestern University *Evanston, IL*

· Awarded a total of $33,000 in my first year at Northwestern University.

Elbridge P. Vance Scholar of Mathematics Jul 2016 - May 2020
Oberlin College *Oberlin, OH*

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

INVITED TALKS, WORKSHOPS, AND TUTORIALS

Improving the National Suicide Prevention Lifeline's Service through Better Call Routing Sep 2022
Data for Good 2022 *Seattle, Washington*

· Joint with Tejumade Afonja, Paula Subías-Beltrán, and Irene Tang

Data Externalities Mar 2021
ACM FAccT 2021 *Virtual*

· Joint with Rediet Abebe, Mihaela Curmei, Andreas Haupt, and Yixin Wang

LEADERSHIP AND SERVICE

Organizer Aug 2022 - Present

· Mechanism Design for Social Good

Working Group Organizer Sep 2021 - Dec 2021

· Data Economies Working group at MD4SG

Membership Manager Jan 2021 - Dec 2021

· Mechanism Design for Social Good

Volunteer Jun 2021

· The 53rd Annual ACM Symposium on Theory of Computing (STOC 2021)

Volunteer Jul 2020

· The Twenty-First ACM Conference on Economics and Computation (EC 2020)

PROFESSIONAL MEMBERSHIPS

Student Member

· Association for Computing Machinery (ACM)

Student Member

· Institute of Electrical and Electronics Engineers (IEEE)

SKILLS

Python, R, PostgreSQL, HTML, CSS, Javascript, Mathematica, LaTeX, Github