Yuhan Cao

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Education

University of Wisconsin - Madison, Madison, Wisconsin, United States 2023 – 2023

Visiting Student in Computer Science (CS) Thematic Track

- Overall GPA: 4.0/4.0
- Selected Coursework: Introduction to Artificial Intelligence (Rank 1/354 in Final)

ShanghaiTech University, Shanghai, China 2020 – Present

B.S. in Computer Science (CS), expected June 2025

- Overall GPA: 3.56/4.0
- Subject Area GPA: 3.95/4.0
- Merit Student in 2022 (top 3% $\sim$ 7%)

Experience

Peking University Beijing, China Jun. 2023 – Nov. 2023

Research Intern advised by Dr. Zhaohua Chen and Prof. Xiaotie Deng

Brief introduction: Due to the high level of automation in enterprise operations, advertising auctions with auto-bidding mechanisms are common in real-life scenarios. The Price of Anarchy (PoA) of the auction mechanism is a notable concern. I mainly focus on the bound of PoA when the number of participants is small.

ShanghaiTech University Shanghai, China Jul. 2022 – Now

Undergraduate Researcher advised by Prof. Dengji Zhao

Brief introduction: Mechanism design on social networks has attracted extensive attention recently. The goal is to design mechanisms to incentivize participants to invite more participants via their social networks. I mainly focus on double auctions, whose challenge is that the participants are competitors. In addition to making breakthroughs in theory, I am also interested in how mechanisms can help people in practical ways.

SI 100B & SI 100F (Introduction to Information Science) Sep. 2021 – Now

Head Teaching Assistant in Spring 2022 Teaching Professor: Yue Qiu

(Head) Teaching Assistant in Fall 2021, 2022, 2023 Teaching Professor: Shenghua Gao

Teaching Assistant in Spring 2023 Teaching Professor: Rui Fan, Shu Yin

Brief introduction: I have been the TA for this course for 5 semesters. I was responsible for the teaching of the Python part, managing and coordinating the whole TA group and doing most of the communication and counselling with the students. I was involved in the design of all the programming assignments and was responsible for most of the content of two assignments. In addition to this, I was responsible for the proposition, syllabus design and main content of the course project, as well as the checking of all teaching assignments. I was also responsible for the Online Judge system, the management and coordination of students' grades. Now I am committed to improving the teaching experience and syllabus of this course and communicating with the teaching committee.

Jingdong Programming and Algorithm Designing Competition 2022 May. 2022 – Jun. 2022

Algorithm Problems Author Collaborated with authors from Tsinghua University

Brief introduction: The finalists in the competition were all ICPC regional gold medallists or high school competitors of equivalent calibre. I used my extensive experience in algorithm competitions to create problems independently, while collaborating with authors from Tsinghua University to compile and review the questions.

- Created three problems individually, including the idea, the problem description, the full standard code and the Input/Output data

- The problems involved sequential data structures (e.g. segment trees, balanced trees, etc.), dichotomies combined with deterministic problems, respectively. All were more in-depth applications
- Involved in problem-checking, including topics in graph theory, strings, Möbius inversion, etc.

CS 101 (Algorithms and Data Structures) Sep. 2022 – Jan. 2023

Teaching Assistant, Leader of Programming Assignments Team Teaching Professor: Dengji Zhao, Yuyao Zhang, Xin Liu, Hao Geng

CS 100 (Introduction to Programming) Feb. 2022 – Jun. 2022

Teaching Assistant Teaching Professor: Lan Xu, Laurent Kneip

Paper & Projects

Double Auction on Diffusion Network Jan. 2023 – Aug. 2023

Miao Li, Yuhan Cao and Dengji Zhao AAAI 2024, Oral Presentation Received

Abstract: In this paper, we designed a mechanism to incentivize participants to invite more participants via their social networks in a double auction. We propose a solution called dynamic trade reduction (DTR), which also guarantees a non-negative revenue for the market owner. Interestingly, our solution is also applicable to the multi-unit one-sided auction when there is only one seller linking to only buyers on the network.

- Proof, Examples, Writing & Numerical Experiments
- Oral Presentation, Poster

Rethinking The Editing of Generative Adversarial Networks: A Method to Estimate Editing Vectors Based on Dimension Reduction Sep. 2022 – Jan. 2023

Yuhan Cao, Haoran Jiang*, Zhenghong Yu*, Qi Li* and Xuyang Li** Teaching Professor: Sipei Yang

Brief introduction: During the project, we propose an optimization solution to the problem of dimension reduction in EditGAN. We designed a Modified Linear Discriminant Analysis and demonstrated by cross validation that our editing vector is more relevant and better than EditGAN. In the project, I was mainly responsible for modelling the specific mathematical problems, and for the procedural validation of the mathematical results. arXiv link: *Here*

- Modelling the dimension reduction problem
- Verified and implemented the mathematical results

KDD Cup 2010 Dec. 2022 – Jan. 2023

Yuhan Cao and Zhenbang Li Teaching Professor: Lu Sun

Brief introduction: In the project, We predicted student performance on mathematical problems from logs of student interaction with Intelligent Tutoring Systems. I used a variety of methods for training. We also fine-tuned the parameters to achieve a 5% improvement over the original results. I was responsible for all coding works.

- All Coding Work
- Cleaning and structuring of raw data
- Studied of feature properties and correlations, further reduced the dimension of data
- Fine-tuned both LSTM and LightGBM, with LightGBM giving the best results

Unity 3D Game Demos Mar. 2021 – Jun. 2021

Yuhan Cao, Hanyu Zhang and Xingyu Han Teaching Professor: Brian Cox

Brief introduction: During the semester I learned the complete process of Unity development and completed four simple game demos.

- Team Leader
- Completely created four game demos (three of which were completed independently), namely a music game, a first-person horror game, a simple action game and a real-time strategy game
- Learned the overall logic of Unity development, programming, animation state automata, scenes and other core production processes

- Led a team in the final project, being responsible for the coordination of the whole team, the division of labour and most of the main process, character and numerical design and state machine design

Skills

- C (with STL): 8 years
- LaTeX: 5 years
- Python: 3.5 years
- C++: 1 year
- C#: 0.5 year
- Unity: 0.5 year
- RISC-V: 0.5 year

Honors and Awards (Selected)

1st in Honorable Mention, Award on ICPC EC Final — Jul. 2022
Outstanding Teaching Assistant — Jun. 2022 & Jan. 2024
3rd Prize, Rank 100, Award on CCPC Weihai Regional — Nov. 2022

Miscellaneous

- Personal Website: https://teafrogsf.github.io
- Original Music Composing & Mixing: 8 years, Latest Work: *Here*