

YUWEI CHENG

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EDUCATION

PhD	University of Chicago Department of Statistics Midwest ML Symposium Poster Award (Top 10%, 500\$ cash price) Spring Quarter Consulting Cup Winner (Best team in the Statistical Consulting Program)	June 2026 (Expected)
BS	National University of Singapore Department of Statistics	June 2020
BA	National University of Singapore Department of Economics Science and Technology Scholarship (Recipient of the prestigious award with 100% tuition fees waiver)	June 2020

SKILLS & SERVICES

Programming: Python, shell scripting, R

Data Analysis: Bayesian hierarchical modelling, Generalized linear models, Gradient boosting, SVM, principal component analysis, neural network, reinforcement learning, sentiment analysis

Teaching: Taught Applied Regression Analysis (2024) and Introduction to Data Science (2021-2024)

Services: Reviewer for The American Statistician (2024) and BMJ Global Health (2023)

RESEARCH EXPERIENCE

Dept. of Computer Science, University of Chicago | Supervisor Dr. Haifeng Xu December 2023 – Present
Linear Contextual Reinforcement Learning with Delayed Poisson Reward

- Formulated autonomous ad bidding as an episodic Markov Decision Process with contextual information
- Modeled the product conversion as a delayed Poisson Reward
- Developed two-stage estimators and proved their optimality for efficiency as an online estimation oracle
- Validating the estimator's performance using real-world ad data using Python with *Gym*, *Torch*, *Optuna*

Single-Agent Poisoning Attacks Suffice to Ruin Multi-Agent Learning August 2023 – Present

- Evaluated the robustness of multi-agent learning algorithms by introducing adversarial attacks on utility observations and theoretically demonstrated the principle: The easier it is to learn, the easier it is to attack
- Proposed a theoretically guaranteed method to tune state-of-the-art gradient-based multi-agent learning algorithms, enhancing their robustness against adversarial attacks
- Simulated multi-agent interactions and implemented learning algorithms to validate the correctness of proposed theorems using Python with *Matplotlib*, *Numpy*, *Scikit-learn*, *Scipy*, *Pandas*
- Manuscripts currently under review

Learning from Imperfect Human Feedback: a Tale from Corruption Robust Dueling March 2023 – October 24

- Studied learning from imperfect human comparative feedback by modeling the potential irrationality or imperfect perception of human preferences as adversarial corruption
- Designed an algorithm, named Robustified Stochastic Mirror Descent for Imperfect Dueling, to learn from imperfect human feedback and proved its optimality in both robustness and learning efficiency
- Evaluated the algorithm's performance on Spotify recommendation data, showing its superiority
- Manuscripts currently under review and available at <https://arxiv.org/abs/2405.11204>

PUBLICATION

Quaye, S. E. D., Cheng, Y., et al. (2023). Application of the network scale-up method to estimate the sizes of key populations for HIV in Singapore using online surveys. *African Journal of Reproduction and Gynaecological Endoscopy*, 26(3), e25973.

Cheng, Y., et al. (2022). Estimates of Japanese encephalitis mortality and morbidity: a systematic review and modeling analysis. *PLOS Neglected Tropical Diseases*, 16(5), e0010361.