Haiqing Gao

haiqinggao2027@u.northwestern.edu | +1 224-275-1242 | haiqing-gao.github.io
Technological Institute, 2145 Sheridan Road, C211, Evanston, IL, 60208

Education

Northwestern University

Ph.D. Candidate in Industrial Engineering and Management Science   Sep. 2022 – Current
- Advisors: Prof. Seyed M.R. Iravani and Prof. Sean R. Sinclair

The Chinese University of Hong Kong, Shenzhen

M. phil. in Computer Information and Engineering   Sep. 2020 – Jun. 2022
- Advisor: Prof. Tsung-hui Chang

B.S. in Applied Mathematics (First Honor)   Sep. 2016 - May 2020

Research Experience

Fair Allocation in Non-Profit Operations: Optimal Routing Policy   Jan. 2023 - Current

Research Assistant, Northwestern University

Supervisor: Prof. Seyed M.R. Iravani and Prof. Sean R. Sinclair

- Modelled an online fair allocation and routing problem using Dynamic Programming (DP)
- Proved the threshold structure of the optimal allocation policy for general distributions and general number of nodes given any routing policy
- Proved the optimality of the decreasing coefficient of variant (CV) order under certain conditions

(Presented in a poster session)

Hybrid Machine Learning via Gradient Tracking   May. 2020 – Jun. 2022

Visiting Student, Shenzhen Research Institute of Big Data   *Supervisor: Prof. Tsung-hui Chang*

- Designed a multiple-steps Gradient Tracking federated learning algorithm to protect the privacy
- Proved the sub-linear convergence of the designed algorithm
- Improved the prediction accuracy by 50% compared to the local training

(Published on a journal)

Federated Q-learning in Mobile Health (mHealth) Intervention   Oct. 2020 - Dec. 2020

- Designed a federated Q-learning algorithm to protect the privacy while accelerating the learning
- Doubled the speed of convergence of the previous Q-learning in mHealth

(Presented in a poster session)

Driver Order Dispatch Fairness on the Online Ride-Hailing Platform   Mar. 2019 - Aug. 2019

Research Assistant, Shenzhen Research Institute of Big Data   *Supervisor: Dr. Ivan Li*

- Formulated a fair online matching problem while capturing the randomness of request arrival and abandonment, and the reusability of offline drivers
- Combined the bottleneck Hungarian algorithm with multi-armed bandit (MAB) to promote data-driven optimization

Publications

- **FedHD: Communication-efficient federated learning from hybrid data**
  Haiqing Gao, Songyang Ge, Tsung-hui Chang
  Journal of the Franklin Institute (2023)

Presentations

- TTIC Workshop Poster Session   Aug. 2024

Honors

The Chinese University of Hong Kong, Shenzhen
Dean's List (Top 10%)   2016-2019
Master's List (Top 10%)   2017-2019
Academic Performance Scholarship (Top 7%)   2017

Teaching Experience

Teaching Assistant
Northwestern University
IEMS 303: Statistics   Fall Quarter 2024
IEMS 307: Quality Improvement by Experimental Design   Spring Quarter 2024
IEMS 302: Probability   Winter Quarter 2024
IEMS 201: Introduction to Statistics or Data-Driven Decision-Making Fall Quarter 2023
The Chinese University of Hong Kong, Shenzhen
MATH 3253: Complex Variables   Spring Semester 2022
STA 2001: Probability and Statistics I   Spring Semester 2019

Lecturer
Northwestern University
Two Lectures in IEMS 302: Combinatorics, Conditional Probability, Continuous Distributions
The Chinese University of Hong Kong, Shenzhen
Online Teaching for High School Students in Oral English   Mar. 2020 - Apr. 2020

Services

INFORMS Peer Mentor   Dec. 2023 - Current
Volunteer, INFORMS Student Chapter at Northwestern University
- Mentored first-year IEMS Ph.D. students

Online Peer Mentor for the English Language Program Foundations   Jun. 2024 – Aug. 2024
Intern, The Graduate School at Northwestern University
- Held zoom meetings to help international students to adapt to the life in the USA
- Participated as mock students in oral English tests

TGS Diversity Peer Mentor   Dec. 2023 – Jun. 2024
Intern, The Office of Diversity and Inclusion at Northwestern University
- Mentored a first-year Northwestern international Ph.D. student

Longgang Special Child Rehabilitation Center Visit   Apr. 2018 - May 2018
Volunteer, Shimmer and Office of Student Affairs of the Chinese University of Hong Kong, Shenzhen
- Accompanied a cerebral palsy child two hours per week

Skills

Programming Languages/Packages: Python, MATLAB, R, Java, LaTeX, TensorFlow, Keras
Languages: Chinese (Native), English (Fluent)