

Fei Wang

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EDUCATION

University of Toronto, Toronto, ON, Canada

Department of Electrical & Computer Engineering

Ph.D. Student, Computer Engineering (transferred from M.A.Sc in Jan 2022)

Sep 2020 – present

- Cumulative GPA: 3.86/4.00

Wuhan University, Wuhan, Hubei, People's Republic of China

Hongyi Honor College

B.Engr., Computer Science and Technology (with honors)

2016 – 2020

- Cumulative GPA: 3.80/4.00
- Rank: 4/34 (selected from 587 students in the School of Computer Science, Wuhan University)

PUBLICATIONS

JOURNALS & MAGAZINES

Fei Wang, Baochun Li, Bo Li, “Federated Unlearning and Its Privacy Threats,” *IEEE Network Magazine*, 2023 (JIF: 10.294).

Fei Wang, Baochun Li, Bo Li, “Quality-Oriented Federated Learning on the Fly,” *IEEE Network Magazine, Special Issue on Federated Optimizations and Networked Edge Intelligence*, 2022 (JIF: 10.294).

Salma Emara, **Fei Wang**, Baochun Li, Timothy Zeyl, “Pareto: Fair Congestion Control with Online Reinforcement Learning,” in *IEEE Transactions on Network Science and Engineering*, 2022 (JIF: 5.033).

CONFERENCES

Fei Wang, Salma Emara, Isidor Kaplan, Baochun Li, Timothy Zeyl, “Multi-Agent Deep Reinforcement Learning for Cooperative Edge Caching via Hybrid Communication,” in *the Proceedings of IEEE ICC 2023, Rome, Italy, May 28 – June 1, 2023*.

Fei Wang, Ethan Hugh, Baochun Li, “More than Enough is Too Much: Adaptive Defenses against Gradient Leakage in Production Federated Learning,” in *the Proceedings of IEEE INFOCOM 2023, New York, May 17 – 20, 2023 (acceptance rate: 19.2%, Best Paper Award)*.

Salma Emara, **Fei Wang**, Isidor Kaplan, Baochun Li, “Ivory: Learning Network Adaptive Streaming Codes,” in *the Proceedings of the 30th IEEE/ACM International Symposium on Quality of Service (IWQoS), Online, June 10 – 12, 2022 (acceptance rate: 24.3%)*.

PATENTS

Zhenhua Hu, Timothy J. Zeyl, Salma Emara, Baochun Li, **Fei Wang**, “Method and Apparatus for Multiple Reinforcement Learning Agents in a Shared Environment,” *filed on December 31, 2021*.

RESEARCH EXPERIENCE

Gradient Leakage in Production Federated Learning

Supervised by Prof. Baochun Li

May 2022 – Aug 2022

Department of Electrical & Computer Engineering, University of Toronto

- Conducted an in-depth study of gradient leakage attacks in the context of production federated learning systems and discovered that the effectiveness and efficiency of existing gradient leakage attacks are weakened by a substantial margin in standard federated learning settings
- Proposed a lightweight defense mechanism that can provide sufficient protection on shared model updates without sacrificing accuracy and convergence speed, and can adapt to time-varying levels of the privacy leakage risk throughout the federated learning process

On the Quality of Model Contributions in Federated Learning

Supervised by Prof. Baochun Li and Prof. Bo Li

May 2021 – Apr 2022

Department of Electrical & Computer Engineering, University of Toronto

- Designed a new aggregation mechanism that uses deep reinforcement learning to dynamically evaluate the quality of model updates, with accommodations for data and device heterogeneity as the training process progresses
- Continually made significant contributions of code in an open-source software framework called Plato designed to facilitate scalable, reproducible, and extensible federated learning research

Towards Efficient Communication in Multi-Agent Deep Reinforcement Learning

Supervised by Prof. Baochun Li

Sep 2020 – Apr 2021

Department of Electrical & Computer Engineering, University of Toronto

- Equipped agents who collaborate on a deep reinforcement learning task with successive deep neural networks to learn to efficiently communicate with each other while updating control strategies
- Investigated the performance of the proposed learning-based multi-agent communication protocol in a real-world content caching application

Refining Congestion Control Using Deep Reinforcement Learning

Research Assistant, advised by Prof. Baochun Li and Dr. Salma Emara

Sep 2019 – Jun 2020

Department of Electrical & Computer Engineering, University of Toronto

- Refined the expert control policy migrated from our target congestion control protocol in terms of code
- Redesigned the switching mechanism between the expert and the agent control policy, and enhanced the agent's learnability
- Built an RL congestion control environment with an asynchronous RL framework where the agent execution does not block the network sender
- Designed an online training scheme to speed up the convergence of the agent's behaviors and improve its generalizability in new network environment

Rethinking Congestion Control with Deep Reinforcement Learning

Research Assistant, advised by Prof. Yanjiao Chen

May 2018 – Jul 2019

School of Computer Science, Wuhan University

- Employed state-of-the-art deep reinforcement learning algorithms to generate congestion control policy
- Widely evaluated the designed scheme and the state-of-the-art TCP variants on emulated and real networks via Mahimahi and Pantheon platforms

TEACHING EXPERIENCE

Teaching Assistant for ECEH1S – ECE Project

Apr 2022 – May 2022

Department of Electrical & Computer Engineering, University of Toronto

- Developed a research database web application using Node.js with PostgreSQL

Teaching Assistant for APS105 – Computer Fundamentals

Jan 2022 – Apr 2022 &

Jan 2023 – Apr 2023

Department of Electrical & Computer Engineering, University of Toronto

- Familiarizing with lab facilities & experimental procedures
- Marking laboratories/practicals work, giving students feedback on their coding style
- Invigilation of final exam

SKILLS

Programming/Scripting Language: Python, C, JavaScript, UNIX Shell Scripting, L^AT_EX, MATLAB
Platforms/Frameworks/Tools: PyTorch, NumPy, Matplotlib, Git, Linux (Ubuntu)

AWARDS & HONORS

- IEEE INFOCOM 2023 Student Travel Grant 2023
- Farid and Diana Najm Graduate Fellowship (received with professor's nomination),
University of Toronto 2023
- IEEE ICNP 2022 Travel Grant 2022
- The Edward S. Rogers Sr. Graduate Scholarship, University of Toronto 2020 – 2023
- Excellent Student Cadre, Wuhan University 2018 & 2019
- Special Overseas Scholarship, Wuhan University 2018 & 2019
- Outstanding Student Scholarship, Wuhan University 2016 – 2019