Linxiao Cao

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Education

University of Science and Technology of China, Hefei, China **Sept. 2021 – Jun. 2024**
M.S. in Computer Science, Department of Data Science
Supervised by Prof. Wei Gong

Anhui University, Hefei, China **Sept. 2017 – Jun. 2021**
B.Eng. in Internet of Things Engineering, School of Internet *GPA: 3.68 (Ranking: 5/97)*

Research Interests

Federated learning, Reinforcement learning, Deep learning in healthcare

Skills

Programming Skills: Python, C, Linux, Pytorch, Jax, Huggingface Transformers
Languages: Chinese (Native), English
English Proficiency: CET-6 546, IELTS 6.5 (L:6.0, R:7.5, S:6.5, W:6.5)

Publications

Federated Inverse Reinforcement Learning for Smart ICUs with Differential Privacy

Wei Gong, **Linxiao Cao**, Yifei Zhu, Fang Zuo, Xin He, Haoquan Zhou* (First Student Author)
Accepted by IEEE Internet of Things Journal 2023

Ventilator and Sedative Management in Networked ICUs Based on Federated Learning

Linxiao Cao, Jia Liu, Yifei Zhu, Haoquan Zhou*, Wei Gong, Weihua Yu, Chaoyou Li.
Accepted by Computer Science 2023 (In Chinese)

SFPrompt: Communication-Efficient Split Federated Fine-Tuning for Large Pre-Trained Models over Resource-Limited Devices

Linxiao Cao, Yifei Zhu, Wei Gong*
Under Review

FERRY: Federated Inverse Reinforcement Learning for Therapeutic Interventions over ICUs

Linxiao Cao, Yifei Zhu, Haoquan Zhou, Shilei Tan, Wei Gong*
Under Review

Patents

An Inverse Reinforcement Learning-based Approach to ICU Ventilator and Sedative Management

Linxiao Cao, Haoquan Zhou, Wei Gong, Yifei Zhu, Min Tang, Qunchao Li.
China Patent: ZL202310151557.4, Granted

A Federated Learning-based Approach to Intelligent Clinical Decision Making in Networked ICUs

Linxiao Cao, Haoquan Zhou, Wei Gong, Yifei Zhu, Min Tang, Qunchao Li.
China Patent: ZL202310151555.5, Granted

Building Intelligent Fire Alarm and Escape System

Wentao Song, **Linxiao Cao**, Shurui Fang, Yuxi Li
China Software Copyright: 2020SR0296931, Granted

Research Experiences

Fine-tuning Large Pre-trained Model to Downstream Tasks in Distributed Setting **Mar. 2023 – Aug. 2023**
Department of Data Science, University of Science and Technology of China *Hefei, China*
Advisor: Prof. Wei Gong and Prof. Yifei Zhu

- Fine-tune a large pre-trained model in a privacy-demanding and resource-constrained distributed environment, where raw data are not allowed to be aggregated and local computing devices have low computation power.
- Split the large pre-trained model into server-side and client-side to lower the computational burden on the client and further introduce prompt parameters to enable efficient fine-tuning.
- Prune the redundant local data and update the model on the client side based on the local loss to further reduce the additional communication cost.

Privacy-preserving Medical Collaborative Decision-Making **Sept. 2021 – Mar. 2023**
Department of Data Science, University of Science and Technology of China *Hefei, China*
Advisor: Prof. Wei Gong and Prof. Yifei Zhu

- Propose a federated learning paradigm incorporated with a differential privacy mechanism to achieve medical record-level privacy protection.
- Propose the framework to jointly combine IRL and FL to solve medical decision problems in the ICUs.
- Construct a pseudo-siamese paradigm with the local and global models to perform joint loss clipping for the clients with data noise to mitigate the negative effect.
- Our method achieves central-competitive performance without aggregating the sensitive raw data.

Work Experience

Research intern at iFLYTEK   **Jun. 2018 − Aug. 2018**
Department of Smart Health, iFLYTEK   *Hefei, China*
Hosted by Liang Chen

- Develop electronic medical record generation software based on patient voice input.

Awards and Honors

Outstanding Graduate of USTC	2024
Academic Scholarship of USTC	2021, 2022, 2023
Outstanding Graduate of Anhui Province	2021
Outstanding Graduate of AHU	2021
Outstanding student scholarship of AHU	2021
Merit Student of AHU	2018, 2019, 2020
Pacemaker to Merit Student Models of AHU	2020
First Class Scholarship for Excellent Study of AHU	2018, 2019, 2020

Activities

Serve as Student Assistant   **Sept. 2023 − Jan. 2023**
Department of Data Science, University of Science and Technology of China   *Hefei, China*
Assist with administrative tasks such as data collection, document processing, etc.

Serve as the Monitor of My Class   **Sept. 2017 − Jun. 2021**
School of Internet, Anhui University   *Hefei, China*
I won the top ten monitor award and my class also won top ten class award in 2021.

Serve as the Principal Student Assistant   **Sept. 2018 − Jun. 2019**
School of Internet, Anhui University   *Hefei, China*
Assist the school office to work and build a communication bridge between the principal and students.

Serve as Vice President of Table Tennis Association   **Sept. 2018 − Jun. 2019**
School of Internet, Anhui University   *Hefei, China*
Our team won the table tennis men's team championship in 2019.