

Bingjie YAN

Trustworthy Federated Learning · Privacy-Preserving ML · AI for Healthcare · Edge AI

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"Nothing is impossible."

Summary

I am a second-year master's student majoring in Artificial Intelligence, with a strong focus on **federated learning** and its applications in **healthcare**. My research aims to develop robust, efficient, scalable, and privacy-preserving AI solutions for real-world healthcare applications. My previous work has primarily focused on **asynchronous federated learning**, **multi-modal** and **privacy-preserving** methods in the medical field. I am looking for a Ph.D position in **25 fall**.

Education

Institute of Computing Technology, Chinese Academy of Sciences

Beijing, China

Master of Engineering, Computer Science

2022.09 - Exp. 2025.06

- M.E., Asynchronous Federated Learning, Medical Application in FL. Advisor: Prof. Yiqiang Chen
- GPA: 3.79/4 (87.9/100)
- Main Courses: Algorithm Design and Analysis(96), Deep Learning(92), Pattern Recognition and Machine Learning(92), Intelligent Computing System(97), Practical Optimization Algorithm and Application(94), etc.

School of Computer Science and Technology, Hainan University

Hainan, China

Bachelor of Engineering, Software Engineering for Big data

2018.09 - 2022.06

- GPA: 3.68/4 (89.65/100), Ranking: 10/181 (5%)
- Main Courses: Linear Algebra(97), Data Structure(99), Advanced Mathematics(90), C++ Programming(96), etc.
- Outstanding Graduate Awards (3%), The First Prize Scholarship (3%) and Merit Student Awards.

Selected Publications

Note: Please refer to my Google Scholar for the complete list. The total # citations exceeds 250, with an h-index of 4.

- **KAMOFL: K-Asynchronous Multi-objective Federated Learning with Privacy, Efficiency, and Utility Trade-offs.**
B. Yan, Y. Chen, Q. Chen, X. Jiang, Y. Kang and T. Zhang. (2024). The 33rd International Joint Conference on Artificial Intelligence (IJCAI'24, CCF-A). **Under review.**
- **Model Trip: Enhancing Privacy and Fairness in Model Fusion across Multi-Federations for Trustworthy Global Healthcare.**
Q. Chen, Y. Chen, B. Yan, X. Jiang, X. Zhang, Y. Kang, et al. (2024). The 40th IEEE International Conference on Data Engineering (ICDE'24, CCF-A). **Accepted.**
- **FedEYE: A Scalable and Flexible End-to-end Federated Learning Platform for Ophthalmology.**
B. Yan, D. Cao, X. Jiang, Y. Chen, W. Dai, et al. (2024). Cell Patterns (SCI, SJR-Q1, IF=6.5). **[PDF]**
- **AFL-CS: Asynchronous Federated Learning with Cosine Similarity-based Penalty Term and Aggregation.**
B. Yan, X. Jiang, Y. Chen, C. Gao and X. Liu. (2023). The 29th IEEE International Conference on Parallel and Distributed Systems (ICPADS'23, CCF-C, Oral). **Accepted.**
- **Experiments of Federated Learning for COVID-19 Chest X-ray Images.**
B. Yan, J. Wang, J. Cheng, et al. (2021). The 7th International Conference on Artificial Intelligence and Security (ICAIS'21, EI). **[arXiv] [PDF] // Cited over 150 times on Google Scholar.**

Project Experiences

Federated Collaborative Platform and System for Digital Ophthalmology

Beijing, China

Research Subject with Aier EYE Hospital (Long-term cooperation)

2021.12 - 2024.06

- **Asynchronous FL.** I propose an asynchronous federated aggregation method, AFL-CS, which takes into account both local gradient direction and global gradient direction. It can achieve faster and more stable convergence, and make the platform more robust to highly heterogeneous environments (network delay, computer power, offline, etc.).
- **Multi-objective Trade-offs.** I propose a theoretical-guided method KAMOFL, bridging theoretical and experimental solutions to obtain better Pareto frontier and achieve better trade-off between privacy, efficiency, and utility in KAFL.
- **Multi-modal FL.** Explore FedAI solutions for ophthalmology (fundus image, OCT image, medical report, etc.) to build a large-scale multi-modal model in modal heterogeneous scenarios via representation learning and modal alignment.
- **FedEYE Platform.** We design a scalable and flexible federated learning platform for ophthalmologist, and provide a user-friendly web interface for quickly launching the federated tasks. The platform is deployed in Aier EYE Hospital and **open** now. It already has **50+** hospitals or institutes and launched **800+** federated tasks.

SmartMedical: Federated Medical Image Analysis System

Hainan, China

Undergraduate Student Innovation and Entrepreneurship Practice Project (Host)

2021.06 - 2022.06

- We develop a medical image recognition software using federated learning without sharing raw patient data.
- We ensemble four models, including VGG, MobileNet, ResNet, and COVID-Net, to enhance system generalization.
- We utilize GradCAM++ to visualize convolutional layers for annotating lesion sites with diagnosis probability for doctor reference. Additionally, we propose a contribution evaluation algorithm, FedCM, for multi-party contribution measurement. [Demo]

Open Source Contributions

FedML-AI Community (contributor & research intern) (★4k+)

2022.06 - 2022.09

- I enhance FedCV with the popular object detection model (e.g. YOLOv5, YOLOv7, YOLOv8, etc.), deploy them to produce environment and provide technical support for the community.
- I completely port the FLamby benchmark (contains 7 real-world federated datasets) to FedML Open Platform.

hCaptcha-challenger (maintainer) (★1.3k+)

2021.12 - 2023.10

- We develop a robust AI-powered captcha solver utilizing Python and Selenium, effectively bypassing hCaptcha with an accuracy exceeding 90%, and provide a user-friendly API for developers.
- I utilize the CLIP model to achieve zero-shot captcha image classification and automatically labeling the captcha images via clustering. With the semantic alignment ability of CLIP, the solver can achieve an open-set recognition.
- I release the hcaptcha-model-factory (★66) with a comprehensive workflow for community.

Awesome-FL (maintainer) (★1.2k+)

2023.06 - present

- I actively contribute to the content, maintain the repository, and keep up with the latest research in FL.

AI-Paper-Collector (maintainer) (★1.1k+)

2021.12 - 2022.12

- We develop an automated paper collector from top AI conferences (NeurIPS, ICML, etc.) with web interface.

Personal Projects

beiyuouo (150+ followers, 500+ stars)

- **arxiv-daily (★77)**: Automatically collect and push the latest arXiv papers to GitHub using GitHub Actions.
- **awesome-asynchronous-federated-learning (★70)**: A collection of papers about asynchronous federated learning.
- **mid-air-draw (★17)**: A simple hand-drawn and gesture recognition system using YOLOv5.

Selected Awards

2017	Silver, (Intl.) Asia-Pacific Informatics Olympiad, APIO	Beijing
2019	First Prize, (Natl.) The 3rd Silk Road Robotics Innovations Competition	Xi'an
2020	Second Prize, (Natl.) Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM)	Beijing
2020	Second Prize, (Natl.) China Collegiate Computing Contest - Group Programming Ladder Tournament	China
2020	Second Prize, (Natl.) Chinese Collegiate Computing Competition	Beijing
2023	Sliver & Bronze, (Natl.) The China International College Students' "Internet+" Innovation and Entrepreneurship Competition	Beijing
2020	Third Prize, (Natl.) China Collegiate Computing Contest - Artificial Intelligence Innovation Contest	Hangzhou
2016	First Prize, (Prov.) National Olympiad in Informatics in Provinces, NOIP	Shandong
2020	First Prize, (Prov.) China Collegiate Computing Contest - Group Programming Ladder Tournament	Hainan
2020	Gold & Sliver, (Prov.) The 6th "Internet+" Innovation and Entrepreneurship Competition in Hainan	Hainan
2021	First Prize, (Prov.) Chinese Undergraduate Electronic Design Contest in Hainan	Hainan
2020	Second Prize, (Prov.) China Collegiate Computing Contest - Artificial Intelligence Innovation Contest	South China

Services

IEEE Hainan University Branch

Hainan, China

President, Student Membership

2021.03 - 2022.06

Association of Robotics and Artificial Intelligence, Hainan University

Hainan, China

Vice President, Co-Founder

2020.07 - 2022.06

Skills & Interests

Language	Chinese(Native), English(Fluent, CET-4: 539, CET-6: 478, IELTS: preparing!!)
Programming	Python (PyTorch, Tensorflow), C/C++, Java, JavaScript, HTML, etc.
AI/ML	Federated AI (FedML, PySyft), Data Analysis (Jupyter, pandas, scikit-learn)
Software Engineering	Git, Docker, Kubernetes, MPI4py, CI/CD, Hadoop, Spark, etc.
Photography	Enjoy the life and capture the moments ;)