Bingjie YAN

Trustworthy Federated Learning · AI for Healthcare · Edge AI · Privacy-Preserving ML
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"Nothing is impossible."

SUMMARY

I am a second-year master's student majoring in Computer Science. My previous work primarily focuses on **asynchronous federated learning**, **privacy-preserving federated learning**, **multi-objective trade-offs** and aim to build a robust, efficient, scalable, and privacy-preserving **AI system** for **real-world healthcare applications**. Furthermore, I have a strong interest in **Edge AI for healthcare**, **multi-modal medical data analysis**, and **multi-modal federated learning**. I am eagerly looking for a Ph.D. position in **Fall 2025**.

EDUCATION

Institute of Computing Technology, Chinese Academy of Sciences (ICT, CAS & UCAS) — Beijing, China

Master of Engineering, Computer Science — 2022.09 - Exp. 2025.06

- **GPA:** 3.79/4. **Research Topic:** Asynchronous Federated Learning, Federated Learning Applications in Medical.
- **Advisor:** Prof. Yiqiang Chen
- **Main Courses:** Algorithm Design and Analysis (96), Deep Learning (92), Pattern Recognition and Machine Learning (92), Intelligent Computing System (97), Practial Optimization Algorithm and Application (94), etc.

School of Computer Science and Technology, Hainan University (211) — Hainan, China

Bachelor of Engineering, Software Engineering for Big data (Big data courses are taught in English) — 2018.09 - 2022.06

- **GPA:** 3.68/4 (89.65/100), **Ranking:** 10/181
- **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 check out Google Scholar for my full publication 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). **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 (Cell Press Journal, SCI, SJR-Q1, IF=6.5).** [PDF] [Code] [Page] [Site]
- **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).** [PDF] [Code]
- **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).** [PDF] [arXiv]
  // Cited over 150 times on Google Scholar.

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 a better Pareto frontier and achieve better trade-offs 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.
- **Model Merge.** We propose a fairness privacy-preserving model merge method, ModelTrip, which can merge the models from different hospitals with fairness concerns and without revealing the raw data. It achieves better performance and fairness than existing methods and enhances the model marketability in the platform.
- **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 online now. It already has 50+ hospitals or institutes participated 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 (Research Intern & Contributor) (★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 semenatic 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, maintaine 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. [Demo]

SELECTED AWARDS

2017	**Silver,** (Intl.) Asia-Pacific Informatics Olympiad, APIO	Beijing
2019	**First Prize,** (Natl.) The 3rd Silk Road Robotics Innovations Competiton	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 Internation 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 ;)