Bingjie YAN

Trustworthy Federated Learning · Biomedical Foundation Model · Edge AI in Healthcare · Privacy-Preserving ML

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"Keep the curiosity."

SUMMARY

I am a second-year master's student majoring in Electronic and Information Engineering. My previous work primarily focuses on **efficient and heterogeneous federated foundation model and system**, particularly in **biomedical and healthcare applications**. I have a strong interest in **large foundation model**, **federated learning**, and **Edge AI for healthcare**. 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, Electronic and Information Engineering *2022.09 - Exp. 2025.06*

- **GPA:** 3.79/4. **Advisor:** Prof. Yiqiang CHEN and Prof. Xinlong JIANG
- **Research Topic:** Asynchronous Federated Learning, Multimodal Federated Foundation Model, FL in Medical & Healthcare.
- **Main Courses:** Pattern Recognition and Machine Learning (92), Intelligent Computing System (97), Practial Optimization Algorithm and Application (94), Algorithm Design and Analysis (96), DL (91), 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.

PUBLICATIONS

Note: Please check out Google Scholar for my full publication list. The total # citations exceeds 250, with an h-index of 4.

Under Review

- **KAMOFL: K-Asynchronous Multi-objective Federated Learning with Privacy, Efficiency, and Utility Trade-offs.** **Bingjie Yan**, Yiqiang Chen*, Qian Chen, Xinlong Jiang, Yan Kang and Teng Zhang. (2024). **Manuscript.**
- **Buffalo: Biomedical Vision-Language Understanding with Cross-Modal Prototype and Federated Foundation Model Collaboration.** **Bingjie Yan**, Qian Chen, Yiqiang Chen*, Xinlong Jiang, Wuliang Huang, Bingyu Wang, Zhirui Wang, Chenlong Gao and Teng Zhang. (2024). **33rd ACM Conference on Information and Knowledge Management (CIKM'24, CORE-A, CCF-B). Under Review.**
- **Correlation-Driven Multi-Modality Graph Decomposition for Cross-Subject Emotion Recognition.** Wuliang Huang, Yiqiang Chen*, Xinlong Jiang, Chenlong Gao, Qian Chen, Teng Zhang, **Bingjie Yan**, Yifan Wang, Jianrong Yang. (2024). **ACM Multimedia 2024 (ACMMM'24, CORE-A*, CCF-A). Under Review.**

Accepted

- **Model Trip: Enhancing Privacy and Fairness in Model Fusion across Multi-Federations for Trustworthy Global Healthcare.** Qian Chen, Yiqiang Chen*, **Bingjie Yan**, Xinlong Jiang, Xiaojin Zhang, Yan Kang, Teng Zhang, Wuliang Huang, Chenlong Gao, Lixin Fan and Qiang Yang. (2024). **40th IEEE International Conference on Data Engineering (ICDE'24, CORE-A*, CCF-A, Oral). Accepted.**
- **Im2col-Winograd: An Efficient and Flexible Fused-Winograd Convolution for NHWC Format on GPUs.** Zhiyi Zhang, Pengfei Zhang, Zhuopin Xu, **Bingjie Yan**, Qi Wang*. (2024). **53rd International Conference on Parallel Processing (ICPP'24, CORE-B, CCF-B). Accepted.**

Published

- **FedEYE: A Scalable and Flexible End-to-end Federated Learning Platform for Ophthalmology.** **Bingjie Yan**, Danmin Cao, Xinlong Jiang, Yiqiang Chen*, Weiwei Dai*, Fan Dong, Wuliang Huang, Teng Zhang, Chenlong Gao, Qian Chen, Zhen Yan and Zhirui Wang. (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.** **Bingjie Yan**, Xinlong Jiang*, Yiqiang Chen*, Chenlong Gao and Xuequn Liu. (2023). **29th IEEE International Conference on Parallel and Distributed Systems (ICPADS'23, CORE-B, CCF-C, Oral).** [PDF] [Code]
- **Experiments of Federated Learning for COVID-19 Chest X-ray Images.** **Bingjie Yan**, Jun Wang, Jieren Cheng*, Yize Zhou, Yixian Zhang, Yifan Yang, Li Liu, Haojiang Zhao, Chunjuan Wang and Boyi Liu. (2021). **7th International Conference on Artificial Intelligence and Security (ICAIS'21, EI).** [PDF] [arXiv]
  // Cited over 150 times on Google Scholar.

- **FedCM: A Real-time Contribution Measurement Method for Participants in Federated Learning.** **Bingjie Yan**, Boyi Liu*, Lujia Wang, Yize Zhou, Zhixuan Liang, Ming Liu and Cheng-Zhong Xu. (2021). **2021 International Joint Conference on Neural Networks (IJCNN'21, CORE-B, CCF-C, Oral).** [arXiv] [PDF]

RESEARCH EXPERIENCES

Federated Foundation Model in Biomedical
Beijing, China

Research Subject with Aier EYE Hospital (China's largest eye service provider) *2024.03 - PRESENT*

- **Large Foundation Model for Downstream Biomedical Tasks.** We use the federated foundation model to build a large-scale biomedical model for downstream tasks, such as fundus image classification, OCT image segmentation, and medical report generation, medical vision question-answering.
- **Missing Modality Imputation in MMFL.** We uncover a challenge in MMFL for biomedical, where severe missing modality. We propose a novel missing modality imputation method in multimodal federated foundation model to handle the missing modality issue in the federated learning scenario.

Federated Collaborative Platform and System for Digital Ophthalmology
Beijing, China

Research Subject with Aier EYE Hospital (China's largest eye service provider) *2021.12 - 2024.06*

- **Asynchronous FL.** I propose an asynchronous federated aggregation method, AFL-CS, which takes into account both the local gradient direction and the 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.).
- **Modal-Heterogeneous FL.** Explore EdgeAI 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 ophthalmologists 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 participating and launched 800+ federated tasks.

Summer Workshop on Trustworthy Multi-objective Optimization Federated Learning
Beijing, China

Host by WeBank & THUAIR, supervised by Qiang YANG, Lixin FAN, and Yan KANG *2023.07 - 2023.12*

- **FL Tuning.** I proposed a theoretical-guided K-Asynchronous Federated Learning Hyperparameters Tuning method, KAMOFL, which can achieve better trade-offs between privacy, efficiency, and utility in KAFL with theoretical guarantees.
- **Model Fusion.** We propose ModelTrip, which can merge the models from different hospitals with fairness and privacy concerns. It achieves better performance and fairness than existing model fusion methods.

SmartMedical: Federated Medical Image Analysis System
Jinan, China

Undergraduate Student Innovation and Entrepreneurship Practice Project (Host) *2021.06 - 2022.06*

- We develop a medical image analysis 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 porting FedCV benchmark (7 real-world federated medical datasets) to **FedML Open Platform**.

hCaptcha-challenger (Maintained) (★1.2k+)
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.

Awesome-FL (Maintainer) (★2k+)
2023.06 - present

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

Personal Projects (★)
beryuuou *(150+ followers, 500+ stars)*

- **arxiv-daily (★84)**: Automatically collect and push the latest arXiv papers to GitHub using GitHub Actions.
- **awesome-asynchronous-federated-learning (★76)**: 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.) 11th Asia and 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**, (Natl.) 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: 6.0 (for now)
Programming	Python (PyTorch, Tensorflow), C/C++, Java, JavaScript, HTML, etc.
AI/ML	Federated AI (FedML, PySyft), Model (transformers, timm)
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 ;)