

# 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), Practical Optimization Algorithm and Application (94), Algorithm Design and Analysis (96), Deep Learning (92), 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.**

### 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 data in the federated learning scenarios.

### 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 or institutes that participated 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, KAMOF, 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 and without extra training. It achieves better performance and fairness than existing model fusion methods.

### 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 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 port the FLamby benchmark (7 real-world federated medical 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.

### 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.

### Personal Projects 🔄

🔄 beiyuouo (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 ;)