Bingjie YAN

Federated Foundation Model · Trustworthy Federated Learning · Distributed Optimization · AI in Healthcare

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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 models and systems**, particularly in **biomedical and healthcare applications**. I have a strong interest in **Collaboration of Large and Small Models**, **Federated Foundation Models**, 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. **Supervisor:** 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), Deep Learning (92), etc.
- **Awards:** Merit Student Awards (10%).

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.
- **Awards:** The First Prize Scholarship (3%), Outstanding Graduate Awards (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

[1] **Bingjie Yan**, Yiqiang Chen*, Qian Chen, Xinlong Jiang, Yan Kang and Teng Zhang. **"KAMOFL: K-Asynchronous Multi-objective Federated Learning with Privacy, Efficiency, and Utility Trade-offs". 39th Annual AAAI Conference on Artificial Intelligence** (CCF-A, CORE-A*). **Manuscript.**

[2] **Bingjie Yan**, Qian Chen, Yiqiang Chen*, Xinlong Jiang, Wuliang Huang, Bingyu Wang, Zhirui Wang, Chenlong Gao and Teng Zhang. **"Buffalo: Biomedical Vision-Language Understanding with Cross-Modal Prototype and Federated Foundation Model Collaboration". 33rd ACM Conference on Information and Knowledge Management** (CCF-B, CORE-A). **Under Review.**

Accepted

[3] Qian Chen, Yiqiang Chen*, Xinlong Jiang, Weiwei Dai, Wuliang Huang, **Bingjie Yan**, Zhen Yan, Lu Wang, Bo Ye. **"PrivFusion: Privacy-Preserving Model Fusion via Decentralized Federated Graph Matching". IEEE Transactions on Knowledge and Data Engineering** (CCF-A, CORE-A*). **Accepted.**

[4] Qian Chen, Yiqiang Chen*, **Bingjie Yan**, Xinlong Jiang, Xiaojin Zhang, Yan Kang, Teng Zhang, Wuliang Huang, Chenlong Gao, Lixin Fan and Qiang Yang. **"Model Trip: Enhancing Privacy and Fairness in Model Fusion across Multi-Federations for Trustworthy Global Healthcare". 40th IEEE International Conference on Data Engineering** (CCF-A, CORE-A*, **Oral**). **Accepted.**

[5] Zhiyi Zhang, Pengfei Zhang, Zhuopin Xu, **Bingjie Yan**, Qi Wang*. **"Im2col-Winograd: An Efficient and Flexible Fused-Winograd Convolution for NHWC Format on GPUs". 53rd International Conference on Parallel Processing** (CCF-B, CORE-B). **Accepted.**

Published

[6] **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. **"FedEYE: A Scalable and Flexible End-to-end Federated Learning Platform for Ophthalmology". Patterns** (Cell Press, JCR-Q1, IF=6.7). [PDF] [Code] [Page] [Site]

[7] **Bingjie Yan**, Xinlong Jiang*, Yiqiang Chen*, Chenlong Gao and Xuequn Liu. **"AFL-CS: Asynchronous Federated Learning with Cosine Similarity-based Penalty Term and Aggregation". 29th IEEE International Conference on Parallel and Distributed Systems** (CCF-C, CORE-B, **Oral**). [PDF] [Code]

[8] **Bingjie Yan**, Jun Wang, Jieren Cheng*, Yize Zhou, Yixian Zhang, Yifan Yang, Li Liu, Haojiang Zhao, Chunjuan Wang and Boyi Liu. **"Experiments of Federated Learning for COVID-19 Chest X-ray Images". 7th International Conference on**

Artificial Intelligence and Security [PDF] [arXiv]
// Cited over 150 times on Google Scholar.

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

[10] **Bingjie Yan**, Jun Wang, Zhen Zhang, Xiangyan Tang*, Yize Zhou, Guopeng Zheng, Qi Zou, Yao Lu, Boyi Liu, Wenxuan Tu and Neal Xiong. **"An Improved Method for the Fitting and Prediction of the Number of COVID-19 Confirmed Cases Based on LSTM". Computers, Materials & Continua** (CMC, JCR-Q3). [PDF]

RESEARCH EXPERIENCES

Summer Workshop on Trustworthy Federated Learning
Beijing, China

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

- **FL Tuning.** Proposed a theoretical-guided K-Asynchronous Federated Learning Hyperparameters Tuning method, KAMOFL, achieving better trade-offs between privacy, efficiency, and utility in KAFL with theoretical guarantees.
- **Model Fusion.** Developed ModelTrip, a method to merge models from different hospitals with fairness and privacy concerns without extra training. Achieved better performance and fairness compared to existing model fusion methods.

PROJECT EXPERIENCES

Federated Foundation Model in Biomedical
Beijing, China

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

- **Federated Foundation Model for Downstream Biomedical Tasks.** Developed a federated foundation model to build a large-scale biomedical model for downstream tasks, including fundus image classification, OCT image segmentation, medical report generation, and medical vision question-answering.
- **Missing Modality Imputation in MMFL.** Uncovered a challenge in MMFL for biomedical, where severe missing modality occurs. Proposed a novel missing modality imputation method in multimodal federated foundation model to handle the missing modality data in federated learning scenarios.

Federated Collaborative Platform and System for Digital Ophthalmology
Beijing, China

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

- **Asynchronous FL.** Proposed an asynchronous federated aggregation method, AFL-CS, which considers both local and global gradient directions. Achieved faster and more stable convergence, making the platform more robust to highly heterogeneous environments.
- **Modal-Heterogeneous FL.** Explored EdgeAI solutions for ophthalmology to build a large-scale multi-modal model in modal heterogeneous scenarios via representation learning and modal alignment.
- **FedEYE Platform.** Designed a scalable and flexible federated learning platform for ophthalmologists with a user-friendly web interface. Deployed the platform in Aier EYE Hospital, attracting 50+ participating hospitals/institutes and launching 800+ federated tasks.

SmartMedical: Federated Medical Image Analysis System
Hainan, China

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

- Developed a medical image analysis software using federated learning without sharing raw patient data.
- Ensembled four models, including VGG, MobileNet, ResNet, and COVID-Net to enhance system generalization.
- Utilized GradCAM++ to visualize convolutional layers for annotating lesion sites with diagnosis probability for doctor reference. Additionally, proposed 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

- Enhanced **FedCV** with popular object detection models (e.g. YOLOv5, YOLOv7, YOLOv8, etc.), deployed them to production environment and provided technical support for the community.
- Ported the entire **FLamby** benchmark (7 real-world federated medical datasets) to **FedML Open Platform**.

hCaptcha-challenger (Maintainer) (★1.3k+)
2021.12 - 2023.10

- Developed a robust AI-powered captcha solver utilizing Python and Selenium, effectively bypassing hCaptcha with an **accuracy exceeding 90%**, and provided a user-friendly API for developers.
- Utilized the CLIP model to achieve zero-shot captcha image classification and automatically labeled the captcha images via clustering. Leveraged the semantic alignment ability of CLIP to achieve open-set recognition.

Awesome-FL (Maintainer) (★1.2k+)
2023.06 - present

- Actively contributed to the content, maintained the repository, and kept up with the latest research in FL.

Personal Projects

beiyuouo *(150+ followers, 500+ stars)*

- **arxiv-daily (★84)**: Developed an automated system to collect and push the latest arXiv papers to GitHub using GitHub Actions.
- **awesome-asynchronous-federated-learning (★76)**: Curated a collection of papers about asynchronous federated learning.
- **mid-air-draw (★17)**: Implemented 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 ;)