



Anjie Le

A Cambridge mathematician with knowledge in data science, federated learning, medical imaging and so on

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EDUCATION

•University of Cambridge, BA Mathematics

2019-2022

Relevant Courses:

Grade: II:1

- **Data Science:** Statistical Modelling, Mathematics of Machine Learning, Linear Algebra
- **Stochastic Process:** Applied Probability, Mathematical Biology
- **Measure Theory:** Probability and Measure
- **Mathematical Modelling and Analysis:** Numerical Analysis, Optimisation, Methods
- **Information and Computer Science:** Graph Theory, Principle of Quantum Mechanics, Quantum Information and Computation, Logic and Set Theory, Groups Rings and Modules, Numbers and Sets

•University of Cambridge, MPhil Data Intensive Science

2023-2024

Covering:

- Data Science, Research Computing, Machine Learning and AI for Science

EXPERIENCE

•Research Assistant: Federated Learning

The Chinese University of Hong Kong

Supervisor: Prof. Qi Dou

Mar 2023 - Sept 2023

- Proposed a differentially private federated learning (FL) approach for optimizing the **trade-off between privacy and performance**, proved its privacy guarantees and asymptotic property (*MICCAI 2023*).
- Proposed a method for Personalized FL using feature analysis to balance client unique knowledge and common knowledge for optimal performance, conduct **convergence analysis** (*ICLR 2024 under review*).

•Work Assistant: Ultrasound Imaging Development

eSonic Imaging

Supervisor: Academician Jacques Souquet

Oct 2022 - Feb 2023; Aug 2021 - Oct 2021

- Investigated the entire process of medical ultrasound product development, facilitating **communication** between different teams to address progress and technological challenges.
- **Initiated and organized** a project for an AI-based breast cancer diagnosis platform using ultrasound images. Developed a prototype to demonstrate its efficacy.
- **Designed and patented** an end-to-end AI research tool on the ultrasound platform, enabling doctors to locally train personalized deep learning models, which can also serve as a hub for federated learning.

•Research Internship: AI Body-Part Detection Tool on Canine CT Scans

VetCT & University of Cambridge

Supervisor: Dr. Julien Labruyère, Advisor: Dr. Michael Roberts

Jul 2022 - Oct 2022

- Utilized YOLOv5 to train a machine learning model for detecting 8 different body parts in dogs. Produced a comprehensive paper outlining the project's purpose, procedure, and significance.
- Conducted data pre-processing on raw CT scans, involving working with DICOM files and applying classical computer vision techniques for **data cleaning**.
- **Presented** the research findings at the **Cambridge Mathematics Placements annual open day**.

•Computer-Aided-Teaching-of-All-Mathematics Projects

University of Cambridge

Part of the final examinations

Jan 2021 - Jun 2021; Jan 2022 - Jun 2022

- Implemented and investigated the effect of various **optimization methods** on high-dimensional equations.
- Conducted numerical simulation and analysis of **quantum eigenstates** for different potentials with perturbations.
- Employed **computational graph theory** to investigate graph colouring and Hamiltonian cycles in large random graphs.
- Conducted numerical simulation and analysis of different **statistical distributions** and **diffusion equations**.
- Implemented algorithms for conversion of **matrix equations** into Row Echelon Form.

SKILLS

Programming: Python, MATLAB, RStudio

Project management: Git, Jira, Confluence

Professional Skills: Operating medical ultrasound devices; public speaking and marketing

Languages: English-Chinese translation and simultaneous interpretation

PUBLICATION, PATENT & PAPER IN PROGRESS

Anjie Le, Haobo Yang, Ziyuan Bao, "A privacy-preserving deployment scheme for large-scale artificial intelligence models based on split learning and federated learning," patent pending (filed).

Meirui Jiang, **Anjie Le**, Xiaoxiao Li, Qi Dou, "Personalized Federated Learning for Non-IID Features via Feature Covariance Discrepancy," ICLR 2024, under review.

Meirui Jiang, Yuan Zhong, **Anjie Le**, Xiaoxiao Li, Qi Dou, "Client-Level Differential Privacy via Adaptive Intermediary in Federated Medical Imaging," MICCAI 2023.

Anjie Le, James Bang, Julien Labruyère, Michael Roberts, "RAPID: Radiology Automated Body-part Identification," preprint.

Baodi Bi, **Anjie Le**, Jacques Souquet, Artificial Intelligence Integrated Diagnostic Platform Device in Ultrasound Modality, patent granted (CN116072300A, 5 May 2023).

Anjie Le, Zhenghao Li, Haoyun Tang, Haobo Yang, A new breast cancer diagnosis application based on ResNet50, in Proceedings of SPIE 12079, Second IYSF Academic Symposium on Artificial Intelligence and Computer Engineering, 120792K (1 December 2021).

OTHER EXPERIENCE

•Co-founder, Chief Knowledge Officer, AI deployment solution startup

Valmech

- Devoted to developing a normative AI deployment solution based on federated learning, addressing concerns of **safety, privacy, and personalization**.
- Propose and implement new R&D plans; **patented the "Split Learning-Based AI Deployment Solution"** concept.
- Received seed round funding offer of 5 million RMB.

•Co-founder, Machine Translation Startup

Guangqi Technology

- Developed a machine translation tool based on ViT, specializing in academic paper translation.

•Quantum Computing Research

University of Science and Technology of China

- Presented at the annual ceremony as an **outstanding-student representative**.
- Got **invited** to join *Dr. Wenkang Weng's* research group, conducted research on quantum approximate optimization algorithms..

•Development of a **Breast Cancer Diagnosis Platform** on Whole Slide Image

Prof. Mark Vogelsberger

- Developed the platform, tuned-the hyperparameters, and **published** the paper.
- Developed a chatbot for the platform using Long Short-Term Memory.

•Team Guide

International Mathematics Olympiad

- Led the group during the event, resolving issues and facilitating communication between different parties.

•Marketing

Blue Education

- Established connections between the company and two high schools in Beijing.

RESEARCH-BASED COMPETITION EXPERIENCE

•International Blockchain Olympiad – One of the two representative projects

- Proposed a theoretical model for applying **blockchain** technology to the tracking of imported food and conducted the feasibility analysis; presented the project at the closing ceremony.

•Beijing Applied Maths Essay Competition – Second Prize

- Proposed a more general model for the Blotto game (a model in **game theory**).

•Beijing Jinpeng Technology Forum – Second Prize

- Explored the effects of toothpaste with or without fluoride on isolated **human teeth**.

•China Adolescents Science & Technology Innovation Contest – Third Prize

- Explored the effects of different light qualities on the **growth of stonecrops**.