

# Gelei Xu

## *Curriculum Vitae*

Department of Computer Science and Engineering  
College of Engineering  
University of Notre Dame  
Notre Dame, IN 46556 USA

Website: <https://gracellgg.github.io/>

Email: [gxu4@nd.edu](mailto:gxu4@nd.edu)

---

## Research Interests

On-device AI, AI for Healthcare, Personalized AI.

## Education

### University of Notre Dame

Ph.D. Student in Computer Science and Engineering

*Advisor:* Yiyu Shi

*GPA:* 4.0/4.0

2023 – Present

*Notre Dame, IN, USA*

### Southern University of Science and Technology

B.E. in Computer Science and Engineering

*Advisor:* Jiang Liu

*GPA:* 3.73/4.0

2019 – 2023

*Shenzhen, Guangdong, China*

## Selected Honors and Awards

Graduate School Professional Development Awards, Notre Dame (\$3750 in total)	2024, 2025
DAC Young Fellow	2024
Lyman Taylor & W Stuart Travel Award (\$1500)	2024
Excellent Graduate in the SUSTech (Top 10%)	2023
Enterprise Intelligence Base Scholarship (¥5000)	2022

## Major Refereed Conference and Journal Papers

- [1] **Incorporating Rather Than Eliminating: Achieving Fairness for Skin Disease Diagnosis Through Group-Specific Experts**

Gelei Xu, Yuying Duan, Zheyuan Liu, Xueyang Li, Meng Jiang, Michael Lemmon, Wei Jin, and Yiyu Shi,

*Proceedings of the 2025 Medical Image Computing and Computer Assisted Interventions (MICCAI 2025, early accept, acceptance rate 9%)*

- [2] **The Cost of Local and Global Fairness in Federated Learning**

Yuying Duan, Gelei Xu, Yiyu Shi, and Michael Lemmon

*Proceedings of the 2025 International Conference on Artificial Intelligence and Statistics (AISTATS 2025)*

- [3] **Enabling On-Device Learning via Experience Replay with Efficient Dataset Condensation**

Gelei Xu, Ningzhi Tang, Jun Xia, Ruiyang Qin, Wei Jin, and Yiyu Shi

*Proceedings of the 2024 Design, Automation & Test in Europe Conference & Exhibition (DATE 2024)*

- [4] **Automatic Cortical Cataract Classification Framework Based on AS-OCT Images**

Gelei Xu\*, Xiaoqing Zhang\*, Zunjie Xiao, Risa Higashita, Wan Chen, Jin Yuan, and Jiang Liu

*Computer Systems & Applications (CSA), 2022, 31(12).*

- [5] **A Novel Local-Global Spatial Attention Network for Cortical Cataract Classification in AS-OCT**

Zunjie Xiao, Xiaoqing Zhang, Qingyang Sun, Zhuofei Wei, Gelei Xu, Yuan Jin, Risa Higashita, and Jiang Liu

*Proceedings of the Pattern Recognition and Computer Vision: 5th Chinese Conference (PRCV 2022).*

- [6] **Channel-Wise and Spatial Feature Recalibration Network for Nuclear Cataract Classification**

Xiaoqing Zhang, Gelei Xu, Junyong Shen, Zunjie Xiao, Qiuyang Yan, Jin Yuan, Risa Higashita, Jiang Liu

*Proceedings of the 2022 IEEE International Conference on Multimedia and Expo (ICME 2022)*

- [7] **CCA-Net: Clinical-awareness Attention Network for Nuclear Cataract Classification in AS-OCT**

Xiaoqing Zhang, Zunjie Xiao, Lingxi Hu, Gelei Xu, Risa Higashita, Wan Chen, Jin Yuan, Jiang Liu  
*Knowledge-Based Systems (KBS), 2022, 250.*

## Lightly Reviewed Posters, Extended Abstracts, and Workshop Papers

- [1] **An Adaptive System for Wearable Devices to Detect Stress Using Physiological Signals**

Gelei Xu, Ruiyang Qin, Zhi Zheng, and Yiyu Shi

*Proceedings of the 2024 Workshop on Conference on Human Factors in Computing Systems (CHI)*

## Research Experience

**Ensuring Fairness in Medical AI Without Compromising Accuracy** 2024 – Present

Lead Researcher, Paper Accepted at MICCAI 2025

*University of Notre Dame*

- Redefine fairness in medical image processing to maximize the performance of each subgroup, rather than minimizing the performance gap.
- Designed an algorithm to train a customized model for each group to maximize performance. Specifically, each group will select the subset that is most helpful to them from the other groups.

**On-Device Efficient Data Condensation**

2023 – 2024

Lead Researcher, Paper Accepted at DATE 2025

*University of Notre Dame*

- Proposed a summarizing method to integrate the knowledge of original images into a more informative memory for on-device learning.

- Efficiently match the training gradients between real samples and synthetic samples, and optimize the samples to better represent the entire data stream distribution in a self-supervised fashion.

**Fair Federated Learning for Dermatological Disease Diagnosis**

2022 – 2023

Lead Researcher

*University of Notre Dame*

- Proposed a framework with in-FL and post-FL to solve the fairness problem systematically and achieve fairness without sacrificing overall classification performance.
- Designed an automatic weight adjuster in our in-FL stage that assigns the weight of each client with the exponential loss value times the scaling factor, which is flexible and efficient to achieve fairness in the extremely imbalanced dataset.

**Cataract Intelligent Diagnosis and Screening System**

2021 – 2022

Lead Researcher, Paper Accepted at Computer Systems &amp; Applications

*SUSTech*

- Proposed an automatic cortical cataract classification framework based on AS-OCT images, utilizing texture features such as gray-level co-occurrence matrix (GLCM), gray-level size zone matrix (GLSZM), and neighborhood gray-tone difference matrix (NGTDM).
- Developed a multimodal-based automatic method for nuclear cataract classification.
- Participated in The Ministry of Education's National College Students' Innovative Entrepreneurial Training Program, where we built an intelligent diagnosis and screening platform for cataracts.

**Professional Experience****Research Assistant**

2023

The First Affiliated Hospital, Sun Yat-sen University

*Guangzhou, China*

- Designed a neural network with doctors for predicting liver tumor prognosis using sequential CT images.

**Teaching Experience****Graduate Associates for Teaching**

2025 – 2026

Kaneb Center, University of Notre Dame

**Teaching Assistant, CSE 20221 Logic Design**

Spring 2024

Department of Computer Science and Engineering, University of Notre Dame

**Teaching Assistant, CSE 40535 Computer Vision**

Fall 2023

Department of Computer Science and Engineering, University of Notre Dame

**Service****Committee Member**, College of Engineering Grad Student Leadership Committee, 2024 – 2025**Reviewer**, TOIS, TECS, MICCAI, RO-MAN, FSS, Scientific Reports