Xinzhe Luo

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Education

School of Data Science, Fudan University — Shanghai, China
Ph.D. in Statistics — *Sep 2019 – Jun 2024*

School of Mathematical Sciences, Fudan University — Shanghai, China
B.S. in Mathematics — *Sep 2015 – Jun 2019*

Research Experience

Imperial College London — London, United Kingdom
Postdoctoral Research Associate, Advisor: Dr. Chen Qin and Dr. Yingzhen Li — *June 2024 – Present*

- Postdoc working at the Department of Electrical and Electronic Engineering and I-X Centre for AI in Science, Imperial College London.
- Developing trustworthy AI systems for MRI reconstruction and general inverse problems. Research interests include generative models, inverse problems, uncertainty quantification, and robustness evaluation.

Fudan University — Shanghai, China
Ph.D. Student, Advisor: Prof. Xiahai Zhuang — *Sep 2019 – Jun 2024*

- Thesis: Multi-Modality Medical Image Groupwise Combined Computing Based on Explicit Modelling.
- Developed statistical modelling and machine learning techniques to achieve multi-modal groupwise image analysis, including groupwise registration and combined computing of cardiac, brain, and abdominal medical images.

Selected Publications

Image Reconstruction and Inverse Problems

- **Xinzhe Luo**, Yingzhen Li, and Chen Qin. "Unsupervised Accelerated MRI Reconstruction via Ground-Truth-Free Flow Matching." *International Conference on Information Processing in Medical Imaging* (IPMI 2025, Oral Presentation).

Multi-modal Groupwise Registration and Combined Computing

- **Xinzhe Luo***, Xin Wang*, Linda Shapiro, Chun Yuan, Jianfeng Feng, and Xiahai Zhuang. "Bayesian Unsupervised Disentanglement of Anatomy and Geometry for Deep Groupwise Image Registration." *arXiv preprint arXiv: 2401.02141* (Under review by IEEE TPAMI, joint first author).
- Xin Wang*, **Xinzhe Luo***, and Xiahai Zhuang. "BInGo: Bayesian Intrinsic Groupwise Registration via Explicit Hierarchical Disentanglement." *International Conference on Information Processing in Medical Imaging* (IPMI 2023, Oral Presentation, joint first author).
- **Xinzhe Luo** and Xiahai Zhuang. "$\mathcal{X}$-Metric: An N-Dimensional Information-Theoretic Framework for Groupwise Registration and Deep Combined Computing." *IEEE Transactions on Pattern Analysis and Machine Intelligence* 45 (2023): 9206-9224.
- **Xinzhe Luo** and Xiahai Zhuang. "MvMM-RegNet: A new image registration framework based on multivariate mixture model and neural network estimation." *International Conference on Medical Image Computing and Computer-Assisted Intervention* (MICCAI 2020, Oral Presentation).

Image Registration and Segmentation

- Bomin Wang*, **Xinzhe Luo***, and Xiahai Zhuang: "Toward Universal Medical Image Registration via Sharpness-Aware Meta-Continual Learning." *International Conference on Medical Image Computing and Computer-Assisted Intervention* (MICCAI 2024, joint first author).
- Qian Yue, **Xinzhe Luo**, Qing Ye, Lingchao Xu, and Xiahai Zhuang: "Cardiac segmentation from LGE MRI using deep neural network incorporating shape and spatial priors." *International Conference on Medical Image Computing and Computer-Assisted Intervention* (MICCAI 2019).

Challenge Benchmarks

- Xiahai Zhuang, Jiahang Xu, **Xinzhe Luo**, ..., Lei Li: "Cardiac segmentation on late gadolinium enhancement MRI: a benchmark study from multi-sequence cardiac MR segmentation challenge." Medical Image Analysis 81 (2022): 102528.

Invited Talks

Tutorial on Diffusion Models for Inverse Problems Apr 2025
School of Information Science and Technology, Fudan University.

Unsupervised Accelerated MRI Reconstruction via Ground-Truth-Free Flow Matching Mar 2025
Invited talk, United Imaging Healthcare, Houston, TX, USA. (Online)

Tutorial on Generative Models for Inverse Problems Mar 2025
Computational Statistics and Machine Learning reading group, Imperial College London.

Uncertainty Quantification in Medical Imaging Feb 2025
Guest lecture, Trustworthy Artificial Intelligence in Medical Imaging, Imperial College London.

BInGo: Bayesian Intrinsic Groupwise Registration via Explicit Hierarchical Disentanglement Jun 2023
Oral presentation, Information Processing in Medical Imaging, San Carlos de Bariloche, Argentina.

Medical Image Registration: A Brief Introduction Sep 2022
Guest lecture, Medical Image Analysis (postgrad), Fudan University.

Mutual-Information Medical Image Registration: Theory and Examples Dec 2021
Guest lecture, Medical Image Analysis (postgrad), Fudan University.

Multivariate Mixture Model for Myocardial Segmentation Combining Multi-Source Images Dec 2020
Guest lecture, Medical Image Analysis (postgrad), Fudan University.

MvMM-RegNet: A New Image Registration Framework Based on Multivariate Mixture Model and Neural Network Estimation Oct 2020
Oral presentation, Medical Image Computing and Computer Assisted Intervention, Lima, Peru. (Online)

Medical Image Registration: Diffeomorphic Demons Nov 2019
Guest lecture, Medical Image Analysis (postgrad), Fudan University.

Academic Services

Journal Review

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Pattern Recognition (PR)
- IEEE Transactions on Medical Imaging (TMI)
- Medical Image Analysis (MedIA)

Conference Review

- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2023, 2024, 2025)

Organization

- Multi-sequence Cardiac MR Segmentation Challenge (MS-CMRSeg 2019)
- Myocardial Pathology Segmentation Combining Multi-Sequence Cardiac Magnetic Resonance Images Challenge (MyoPS 2020)

Awards & Achievements

Outstanding Ph.D. Graduate, Fudan University, 2024

IEEE TMI Distinguished Reviewer, IEEE Transactions on Medical Imaging, 2022-2023, 2023-2024

China National Scholarship, Ministry of Education, People's Republic of China, 2023

Honourable Mention for the Francois Erbsmann Prize, Information Processing in Medical Imaging, 2023

China National Scholarship, Ministry of Education, People's Republic of China, 2020

MISCELLANEOUS

Skills

Programming: Python, PyTorch, TensorFlow

Techniques: Bayesian statistics, Probabilistic graphical model, Image processing and analysis, Representation learning

Languages: Chinese (Native), English (Professional)

CV last updated: April 7, 2025