Peirong Liu

Postdoctoral Researcher
Athinoula A. Martinos Center for Biomedical Imaging
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Education

University of North Carolina at Chapel Hill — Chapel Hill, U.S
Ph.D. in Computer Science — Aug 2018 – Jun 2023
- Advisor: Dr. Marc Niethammer
- Thesis committee: Dr. Yueh Z. Lee, Dr. Stephen Aylward, Dr. Colin Raffel, Dr. Gedas Bertasius

Shanghai University — Shanghai, China
B.S. in Mathematics and Applied Mathematics — Sep 2014 – Jun 2018
- GPA: 3.95/4.00 (Rank: 1/305)
- President's List; National Scholarship

Summary

My research interest lies in **AI for Biomedical Imaging**, at an intersection of machine learning, computer vision, and medical imaging. In particular, my recent research topics include
- Partial differential equations, optimal transport, physics-driven deep learning
- Generative models, modality-agnostic medical imaging foundation models
- Clinical applications: perfusion imaging, CT/MR imaging, stroke diagnosis

Experience

Harvard Medical School & Massachusetts General Hospital — Boston, U.S
Postdoctoral researcher (Host: Dr. Juan Eugenio Iglesias) — Aug 2023 – present
- Modality-agnostic foundation models for medical imaging
- Pathology representation and detection

Department of Computer Science, University of North Carolina at Chapel Hill — Chapel Hill, U.S
Research assistant (Advisor: Dr. Marc Niethammer) — Jan 2019 – Aug 2023
- Partial differential equations, Physics-driven deep learning for perfusion imaging
- Research on regularized optimal mass transport (rOMT) and non-rigid fluid-based image registration

Computer Vision (Generative AI), Meta AI — New York, U.S
Research Intern: open-vocabulary object detection, multi-object tracking — May 2022 – Nov 2022

Computer Vision (Content Understanding), Facebook AI — New York, U.S
Research Intern: unsupervised image synthesis, motion transfer — May 2021 – Nov 2021

Biomedical Research Imaging Center, University of North Carolina at Chapel Hill — Chapel Hill, U.S
Research assistant (Advisors: Dr. Dinggang Shen and Dr. Pew-Thian Yap) — Aug 2018 – Dec 2018
- Geometric deep learning for mesh-structured data

Selected Publications

Peirong Liu, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan E. Iglesias. "Brain-ID: Learning Contrast-agnostic Anatomical Representations for Brain Imaging". *ECCV*, 2024. [paper] [code]

Peirong Liu, Oula Puonti, Annabel Sorby-Adams, William T. Kimberly, Juan E. Iglesias. "PEPSI: Pathology-Enhanced and Pulse-Sequence-Invariant Representations for Brain MRI". *MICCAI*, 2024. [paper] [code]

Pablo Laso, Stefano Cerri, Annabel Sorby-Adams, Jennifer Guo, Farrah Matteen, Philipp Goebl, Jiaming Wu, **Peirong Liu**, Hongwei Li, Sean I. Young, Benjamin Billot, Oula Puonti, Gordon Sze, Sam Payabvash, Adam Dehavenon, Kevin N. Sheth, Matthew S. Rosen, John Kirsch, Nicola Strisciuglio, Jelmer M. Wolterink, Arman Eshaghi, Frederik Barkhof, William T. Kimberly, Juan E. Iglesias. "Quantifying White Matter Hyperintensity and Brain Volumes in Heterogeneous Clinical and Low-Field Portable MRI". *ISBI*, 2024. (Oral) [paper] [FreeSurfer]

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "Deep Decomposition for Stochastic Normal-Abnormal Transport". *CVPR*, 2022. (Oral) [paper] [code]

Peirong Liu, Lin Tian, Yubo Zhang, Stephen Aylward, Yueh Z. Lee, Marc Niethammer. "Discovering Hidden Physics Behind Transport Dynamics". *CVPR*, 2021. (Oral) [paper] [code]

Zhengyang Shen, Jean Feydy, **Peirong Liu**, Ariel Hernán Curiale, Ruben San José Estépar, Marc Niethammer. "Accurate Point Cloud Registration with Robust Optimal Transport". *NeurIPS*, 2021. [paper] [code]

Zhipeng Ding, Xu Han, **Peirong Liu**, Marc Niethammer. "Local Temperature Scaling for Probability Calibration". *ICCV*, 2021. [paper] [code]

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "Perfusion Imaging: An Advection Diffusion Approach". *IEEE TMI*, 2021. [paper] [code]

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "PIANO: Perfusion Imaging via Advection-diffusion". *MICCAI*, 2020. (Early accept; Oral) [paper] [code]

Lin Tian, Connor Puett, **Peirong Liu**, Zhengyang Shen, Stephen Aylward, Yueh Z. Lee, Marc Niethammer. "Fluid registration between lung CT and stationary chest tomosynthesis images". *MICCAI*, 2020. (Oral) [paper] [code]

Peirong Liu, Zhengwang Wu, Gang Li, Pew-Thian Yap, Dinggang Shen. "Deep Modeling of Growth Trajectories for Longitudinal Prediction of Missing Infant Cortical Surfaces". *IPMI*, 2019. (Oral) [paper] [code]

Under Submission

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "HARP: Hemisphere-normalized Atlas Representing Perfusion". *In Submission*, 2024.

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "D^2-SONATA+: Deep Decompositions for Stochastic Normal-Abnormal Transport". *In Submission*, 2023.

Invited Talks

Perfusion Imaging via Mass Transport

Athinoula A. Martinos Center for Biomedical Imaging, Harvard Medical School, Charlestown, US — Mar 2023

Boston Children's Hospital, Harvard Medical School, Boston, US — Feb 2023

Brigham and Women's Hospital, Harvard Medical School, Boston, US — Jan 2023

Weill Cornell Medicine, Cornell University, New York, US — Dec 2022, Jun 2023

Deep Decomposition for Stochastic Normal-Abnormal Transport

CVPR'22, New Orleans, US — Jun 2022

Discovering Hidden Physics Behind Transport Dynamics

CVPR'21, Virtual — Jun 2021

Perfusion Imaging via Advection-diffusion

MICCAI'20, Virtual — Oct 2020

Deep Modeling of Growth Trajectories for Longitudinal Prediction of Missing Infant Cortical Surfaces

IPMI'19, Hong Kong, China — Jun 2019

Honors

MICCAI Student Travel Award, *Lima* — 2020

IPMI Scholarship, *Hong Kong* — 2019

President's List, *Shanghai University (the Highest honor, Top 10 university-wise)* — 2018

Shanghai Outstanding Graduate, *Shanghai* — 2018

Baogang Outstanding Student Award, *Shanghai (Top 4 university-wise)* — 2017

National Scholarship, *Shanghai University (Top 1%)* — 2017

Finalist Winner, *U.S. Mathematical Contest In Modeling (MCM) (Team leader, 36/8843)* — 2017

Third Prize, *Shanghai Mathematics Competitions (Math Major)* — 2016

Top Grade Scholarship, *Shanghai University (Top 3 department-wise)* — 2015-2017

Outstanding Student Award, *Shanghai University* — 2015-2017

Academic Innovation Award, *Shanghai University* — 2015-2016

Leadership Award, *Shanghai University* — 2015

Public Service Award, *Shanghai University* — 2015

DEI

Volunteer research mentor at Talaria Summer Institute, for students of underrepresented genders

Member and guest speaker at UNC GWiCS (Graduate Women in Computer Science)

Services

Editorial board of Artificial Intelligence in Radiology

Reviewer of NeurIPS, ICLR, CVPR, ICCV, ECCV, MICCAI, IPMI, ISBI, Frontiers in Radiology

Skills

Computer: Python, MATLAB, C/C++, LaTeX, HTML, JAVA, R

Libraries & OS: PyTorch, TensorFlow, ITK, FreeSurfer; Linux (Ubuntu), Mac OSX

Languages:

- Mandarin (Native Proficiency)
- English (Full Professional Proficiency)
  - TOEFL: 116 (R-30, L-30, S-27, W-29)
  - Shanghai Advanced-level English Interpretation Certificate

Misc: Guzheng (Professional Level-10 with Distinction); Piano; Drums; Rock Climbing