Peirong Liu

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Athinoula A. Martinos Center for Biomedical Imaging
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♀ she/her
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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

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 application: Perfusion imaging, CT/MR imaging, stroke

Experience

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

Department of Computer Science, University of North Carolina at Chapel Hill — Chapel Hill, U.S
Research assistant (Supervisor: Dr. Marc Niethammer) — Jan 2019 – Aug 2023
- Research on PDE/Physics-informed deep learning for perfusion imaging analysis
- 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 — May 2022 – Nov 2022
- Research on open-vocabulary image and video object detection, multi-object tracking

Computer Vision (Content Understanding), Facebook AI — New York, U.S
Research Intern — May 2021 – Nov 2021
- Research on self-supervised, neural-ODE-based general framework for multi-view motion transfer

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

Selected Publications

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. [paper] [FreeSurfer]

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "Deep Decomposition for Stochastic Normal-Abnormal Transport". *CVPR*, 2022. (Oral - 4.0%) [paper] [code]

Peirong Liu, Lin Tian, Yubo Zhang, Stephen Aylward, Yueh Z. Lee, Marc Niethammer. "Discovering Hidden Physics Behind Transport Dynamics". *CVPR*, 2021. (Oral - 3.7%) [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. (Oral - 5%, student travel award) [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. [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 - 10%, IPMI scholarship) [paper] [code]

Under Submission

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

Peirong Liu, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan E. Iglesias. "Brain-ID: Learning Robust Feature Representations for Brain Imaging". *In Submission to ECCV*, 2024. [paper] [code]

Peirong Liu, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. "HARP: Hemisphere-normalized Atlas Representing Perfusion". *In Submission to Radiology*, 2023.

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

Talks

Perfusion Imaging via Advection-diffusion

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
Medical Image Computing and Computer Assisted Intervention (MICCAI), Virtual Oct 2020

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

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 underrepresented genders
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