

Chen Liu

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Education

Yale University, Ph.D. in Computer Science.

New Haven, CT. Aug 2022 - May 2027

Ph.D. Advisor [Smita Krishnaswamy](#), Associate Professor of Computer Science and Genetics

Research Areas Deep Learning, Manifold Learning, Computer Vision, Medical Imaging.

Teaching Fellow (1) Deep Learning on Graphs ([Rex Ying](#)), (2) AI Foundation Models (LLM) ([Arman Cohan](#)).

Columbia University, M.S. in Electrical Engineering

New York, NY. Aug 2018 - Feb 2020

• Nikola Tesla Electrical Engineering Scholar (“to the most exceptional applicants”, ≈ top 10% among those admitted)

Bucknell University, B.S. in Electrical Engineering, Minor in Biomedical Engineering

Lewisburg, PA. Aug 2014 - May 2018

• Tau Beta Pi Honor, Alpha Lambda Delta Honor, ILTM student consultant

Academia Experience

Ph.D. Research @ Yale University

New Haven, CT. Aug 2021 - Jul 2022

As a Ph.D. student, I specialize in the theory and applications of deep learning, with a focus on manifold learning.

Quantifying entropy and mutual information in neural networks: Defined a novel entropy measure leveraging diffusion geometry that can operate robustly at very high data dimensions and is applicable to modern-scale deep neural networks.

Paper #3

Unsupervised multigranular medical image segmentation: Extracted latent representation of images with intra-image contrastive learning and a local reconstruction objective, and coarse-grained into segments using diffusion condensation.

Paper #4

Prediction of longitudinal progression over irregularly-sampled medical images: Proposed a registration-free method to temporally extrapolate images by modeling the time-dependent variations while isolating the confounding factors.

Industry Experience

Senior Research Scientist @ GE Healthcare

San Ramon, CA. Aug 2021 - Jul 2022

Research and development of deep learning solutions in medical imaging.

Keypoint detection: Designed an adversarial objective to improve detection of anatomical landmarks in X-ray images.

Patent #1

Image classification: Classified X-ray images on whether they contain unwanted external objects.

Patent #2

Research Software Engineer @ Matician Inc

Palo Alto, CA. Jan 2021 - Jun 2021

In a team of 3, developed SLAM from scratch in Rust, running 30 times faster than the SOTA ORB-SLAM using only visual input.

Real-time SLAM research & development: Covered re-localization, loop detection, geometric and temporal check, etc.

Research Assistant (Funded by Grant) @ Columbia University Medical Center

New York, NY. Dec 2019 - Nov 2020

Return offer after working in the lab. Led or participated in projects and mentored master students in research.

Authored 10+ publications in conferences or journals.

Image-to-image translation & downstream analysis: Image synthesis to bypass harmful contrast agents in MRI.

Paper #5

Signal processing & signal registration: Designed and developed a software for MR spectroscopy processing.

Paper #6

Semantic segmentation: Improved dense cell segmentation with edge feature enhancement.

Paper #7

Skills

Research Machine Learning, Deep Learning, Information Theory, Computer Vision, Medical Imaging (radiology): MRI, CT, etc.

Programming Python (PyTorch, TensorFlow, Numpy, etc.), \LaTeX , Linux Bash, Git, Docker, Rust, C++

Achievements and Services

active **Reviewer**, *Conferences* NeurIPS 2021-23, ICLR 2022-24, ICML 2022. *Journals* IEEE TNNLS.

2022 **Outstanding Reviewer Award**, International Conference on Machine Learning (ICML)

top 10%

Selected Publications and Patents

- Co-inventor. “System and Method for Obtaining Accurate Measurements and Quantification of X-Ray Image from Estimation of Key Anatomical Locations”. **US Patent App.** GE Healthcare. [[Patent](#)]
- Co-inventor. “X-Ray Lead Marker Detection System for X-Ray Imaging System”. **US Patent App.** GE Healthcare. [[Patent](#)]
- Danqi Liao*, [Chen Liu*](#), et al. “Assessing Neural Network Representations During Training Using Noise-resilient Diffusion Spectral Entropy”. Presented at the **TAG-ML Workshop, ICML 2023**. [[Git](#)]
- [Chen Liu*](#), et al. “CUTS: A Framework for Multigranular Unsupervised Medical Image Segmentation”. Under review. [[PDF](#)] [[Git](#)]
- [Chen Liu*](#), et al. “Deep learning of MRI contrast enhancement for mapping cerebral blood volume from single-modal non-contrast scans of aging and Alzheimer’s disease brains”. *Frontiers on Aging Neuroscience* (Impact Factor: 5.7). [[PDF](#)] [[Git](#)]
- [Chen Liu](#), et al. “JET – A MATLAB Toolkit for Automated J-Difference-Edited MR Spectra Processing of in vivo Mouse MEGA-PRESS Study at 9.4 T”. *ISMRM 2021*. [[PDF](#)] [[Git](#)]
- Nanyan Zhu*, [Chen Liu*](#), et al. “Segmentation with Residual Attention U-Net and an Edge-Enhancement Approach Preserves Cell Shape Features”. *IEEE EMBC 2022*. [[PDF](#)] [[Git](#)]