Chen Liu

📱 (570)939-7703 | ✉ chen.liu.cl2482@yale.edu | 🐙 github.com/ChenLiu-1996 | in linkedin.com/in/chenliu1996 | 🎓 Google Scholar

Education

Yale University, Ph.D. in Computer Science. Advised by Smita Krishnaswamy   *New Haven, CT. Aug 2022 - May 2027*

    Research Areas   Deep Learning, Manifold Learning, Computer Vision, Spatial-Temporal Modeling, 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*

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 @ Matic   *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.

Academia Experience

Ph.D. Research @ Yale University   *New Haven, CT. Aug 2021 - Jul 2022*

I investigate the theory and applications of deep learning, specializing in spatial-temporal modeling and biomedical images.

    Forecasting spatial-temporal progression over irregularly-sampled time-series images: Proposed position-parameterized neural differential equations to perform image-level trajectory inference over irregularly-sampled longitudinal medical images.   Paper #1

    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 #2

    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 #3

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 4 journal articles, 2 conference papers, and 7 conference abstracts.

    Image-to-image translation & downstream analysis: Image synthesis to bypass harmful contrast agents in MRI.   Paper #4
    Signal processing & signal registration: Designed and developed a software for MR spectroscopy processing.   Paper #5
    Semantic segmentation: Improved dense cell segmentation with edge feature enhancement.   Paper #6

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 2021-2024, ICLR 2022-2024, ICML 2022,2024. Journals IEEE TNNLS.	
2024	**CitationMap,** Personal project with 300+ stars.	[Git]
2022	**Outstanding Reviewer Award,** International Conference on Machine Learning (ICML).	*top 10%*

Selected Publications and Patents

1. Chen Liu*, et al. "ImageFlowNet: Forecasting Multiscale Trajectories of Disease Progression with Irregularly-Sampled Longitudinal Medical Images". Under Review. [PDF] [Git]
2. Danqi Liao*, Chen Liu*, et al. "Assessing Neural Network Representations During Training Using Noise-resilient Diffusion Spectral Entropy". ***ICML 2023 Workshop*** and *IEEE 58th Annual Conference on Information Sciences and Systems (CISS 2024)*. [PDF] [Git]
3. Chen Liu*, et al. "CUTS: A Deep Learning and Topological Framework for Multigranular Unsupervised Medical Image Segmentation". *27th International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI 2024**)*. [PDF] [Git]
4. 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 in 2021). [PDF] [Git]
5. 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]
6. 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]
1. 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]
2. Co-inventor. "X-Ray Lead Marker Detection System for X-Ray Imaging System". ***US Patent App.*** GE Healthcare. [Patent]