

Xiaoling Hu

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Current Position	<ul style="list-style-type: none">• Harvard Medical School, Athinoula A. Martinos Center for Biomedical Imaging, USA Aug. 2023 - Present <i>Postdoctoral Research Fellow</i> - Hosted by Prof. Juan Eugenio Iglesias and Prof. Bruce Fischl
Research Interests	<p>My research interest is Biomedical AI, and I am focusing on developing core AI/ML algorithms applied to medical imaging problems. In particular, I am interested in:</p> <ul style="list-style-type: none">• Topology-Driven Deep Image Analysis• Uncertainty Estimation and Its Applications• Learning with Imperfect Data• Brain Image Analysis
Education	<ul style="list-style-type: none">• Stony Brook University, Department of CS, USA Jan. 2018 - June 2023 <i>Doctor of Philosophy</i> - Advisor: Chao Chen - Thesis: Learning Topological Representations for Deep Image Understanding - Committee: Chao Chen, Dimitris Samaras, Haibin Ling, Li Fuxin• Tsinghua University, Department of EE, China Sep. 2014 - June 2017 <i>Master of Science</i>• Huazhong University of Science and Technology, Department of EE, China Sep. 2010 - June 2014 <i>Bachelor of Science</i>
Selected Publications	<p>(* indicates equal contribution, [†] denotes students working closely with me)</p> <ol style="list-style-type: none">[1] Anomaly-Guided Weakly Supervised Lesion Segmentation on Retinal OCT Images Jiaqi Yang[†], Nitish Mehta, Gozde Merve Demirci[†], <u>Xiaoling Hu</u>, Meera Ramakrishnan, Mina Naguib, Chao Chen, Chialing Tsai <i>Medical Image Analysis (MedIA)</i>, 2024[2] Topology-Aware Uncertainty for Image Segmentation Saumya Gupta[†], Yikai Zhang, <u>Xiaoling Hu</u>, Prateek Prasanna, Chao Chen <i>Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)</i>, 2023[3] Calibrating Uncertainty for Semi-Supervised Crowd Counting Chen Li[†], <u>Xiaoling Hu</u>, Shahira Abousamra, Chao Chen <i>International Conference on Computer Vision (ICCV)</i>, 2023[4] Enhancing Modality-Agnostic Representations via Meta-Learning for Brain Tumor Segmentation Aishik Konwer[†], <u>Xiaoling Hu</u>, Xuan Xu, Joseph Bae, Chao Chen, Prateek Prasanna <i>International Conference on Computer Vision (ICCV)</i>, 2023

- [5] **Learning Probabilistic Topological Representations Using Discrete Morse Theory**
Xiaoling Hu, Dimitris Samaras, Chao Chen
International Conference on Learning Representations (ICLR), 2023 (**Spotlight, notable-top-25%**)
- [6] **Confidence Estimation Using Unlabeled Data**
 Chen Li[†], Xiaoling Hu, Chao Chen
International Conference on Learning Representations (ICLR), 2023
- [7] **Structure-Aware Image Segmentation with Homotopy Warping**
Xiaoling Hu
Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS), 2022
- [8] **Learning Topological Interactions for Multi-Class Medical Image Segmentation**
 Saumya Gupta^{*†}, Xiaoling Hu^{*}, James Kaan, Michael Jin, Mutshipay Mpoy, Katherine Chung, Gagandeep Singh, Mary Saltz, Tahsin Kurc, Joel Saltz, Apostolos Tassiopoulos, Prateek Prasanna, Chao Chen
European Conference on Computer Vision (ECCV), 2022 (**Oral, 2.7%**)
- [9] **Trigger Hunting with a Topological Prior for Trojan Detection**
Xiaoling Hu, Xiao Lin, Michael Cogswell, Yi Yao, Susmit Jha, Chao Chen
International Conference on Learning Representations (ICLR), 2022
- [10] **A Manifold View of Adversarial Risk**
 Wenjia Zhang, Yikai Zhang, Xiaoling Hu, Mayank Goswami, Chao Chen, Dimitris Metaxas
International Conference on Artificial Intelligence and Statistics (AISTATS), 2022
- [11] **Topology-Attention ConvLSTM Network for 3D Image Segmentation**
 Jiaqi Yang^{*†}, Xiaoling Hu^{*}, Chao Chen, Chialing Tsai
International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2021
- [12] **Topology-Aware Segmentation Using Discrete Morse Theory**
Xiaoling Hu, Yusu Wang, Li Fuxin, Dimitris Samaras, Chao Chen
International Conference on Learning Representations (ICLR), 2021 (**Spotlight, 5.6%**)
- [13] **3D Topology-Preserving Segmentation with Compound Multi-Slice Representation**
 Jiaqi Yang^{*†}, Xiaoling Hu^{*}, Chao Chen, Chialing Tsai
IEEE International Symposium on Biomedical Imaging (ISBI), 2021
- [14] **Topology-Preserving Deep Image Segmentation**
Xiaoling Hu, Li Fuxin, Dimitris Samaras, Chao Chen
Thirty-third Conference on Neural Information Processing Systems (NeurIPS), 2019
- [15] **Saliency Detection based on Integration of Central Bias, Reweighting and Multi-Scale for Superpixels**
Xiaoling Hu, Wenming Yang, Fei Zhou, Qingmin Liao
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2016

Preprints

(* indicates equal contribution, [†] denotes students working closely with me)

- [1] **Semi-Supervised Contrastive VAE for Disentanglement of Digital Pathology Images**
Mahmudul Hasan[†], Xiaoling Hu, Shahira Abousamra, Prateek Prasanna, Joel Saltz, Chao Chen
Tech Report
- [2] **Hard Negative Sample Mining for Whole Slide Image Classification**
Wentao Huang[†], Xiaoling Hu, Shahira Abousamra, Prateek Prasanna, Chao Chen
Tech Report
- [3] **Registration by Regression (RbR): a framework for interpretable and flexible atlas registration**
Karthik Gopinath*, Xiaoling Hu*, Malte Hoffmann, Oula Puonti, Juan Eugenio Iglesias
Tech Report
- [4] **P-Count: Persistence-based Counting of White Matter Hyperintensities in Brain MRI**
Xiaoling Hu, Annabel Sorby-Adams, Frederik Barkhof, William Kimberly, Oula Puonti, Juan Eugenio Iglesias
Tech Report
- [5] **Spatial Diffusion for Cell Layout Generation**
Chen Li[†], Xiaoling Hu, Shahira Abousamra, Meilong Xu, Chao Chen
Tech Report
- [6] **TopoSemiSeg: Enforcing Topological Consistency for Semi-Supervised Segmentation of Histopathology Images**
Meilong Xu[†], Xiaoling Hu, Saumya Gupta, Shahira Abousamra, Chao Chen
Tech Report
- [7] **Brain-ID: Learning Robust Feature Representations for Brain Imaging**
Peirong Liu, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan Eugenio Iglesias
Tech Report
- [8] **Deep Statistic Shape Model for Myocardium Segmentation**
Xiaoling Hu, Xiao Chen, Terrence Chen, Shanhui Sun
Tech Report

Selected Honors and Awards

- Catacosinos Fellowship (2 out of 200+ PhD students in SBU CS Department), 2023
- NeurIPS Travel Award, 2019
- First-class Scholarship, Tsinghua University, 2016 (5%)

Industry Experiences

- **Allen Institute, USA** May 2022 - Aug. 2022
Research Intern
Mentor: Dr. Matheus Viana
Topic: Topology-Aware Image Segmentation
- **United Imaging Intelligence (UII), USA** May 2021 - Aug. 2021
Research Intern
Mentor: Dr. Shanhui Sun
Topic: Deep Shape Model Based Network

- **Tencent Youtu Lab, China** Jun. 2017 - Jan. 2018
Research Intern
Mentor: Dr. Yuwing Tai
Topic: Clothes Detection, Attribute Prediction

Mentoring

- Jiaqi Yang (**MICCAI'21, ISBI'21, MedIA'24**), Ph.D Candidate at Department of CS, CUNY Since Spring 2020
- Chen Li (**ICLR'23, ICCV'23**), Ph.D Candidate at Department of BMI, Stony Brook University Since Fall 2021
- Saumya Gupta (**ECCV'22, NeurIPS'23**), Ph.D Candidate at Department of CS, Stony Brook University Fall 2021 – Summer 2023
- Meilong Xu, Ph.D Student at Department of CS, Stony Brook University Since Summer 2023
- Wentao Huang, Ph.D Student at Department of CS, Stony Brook University Since Summer 2023
- John Xie, High School Student → University of Michigan Summer 2021

Professional Organizer Service

- MICCAI'24 workshop on *The First Workshop on Topology- and Graph-Informed Imaging Informatics (TGI3)* 2024
- MICCAI'23 tutorial on *Topology-Driven Image Analysis* 2023

Reviewing

- International Conference on Machine Learning (ICML) Since 2022
- International Conference on Learning Representations (ICLR) Since 2022
- Conference on Neural Information Processing Systems (NeurIPS) Since 2021
- Computer Vision and Pattern Recognition (CVPR) Since 2021
- European Conference on Computer Vision (ICCV) Since 2021
- European Conference on Computer Vision (ECCV) Since 2022
- Winter Conference on Applications of Computer Vision (WACV) Since 2022
- Artificial Intelligence and Statistics (AISTATS) Since 2022
- Learning on Graphs Conference (LoG) Since 2022
- Medical Imaging with Deep Learning (MIDL) Since 2022
- AAAI Conference on Artificial Intelligence (AAAI) Since 2022
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) Since 2020
- Pattern Recognition (PR)
- IEEE Transactions on Medical Imaging (TMI)

Talks	Deep Structural Reasoning for Biomedical Imaging	
	• School of CAI, Arizona State University	Feb. 2024
	Topology-Aware Deep Image Segmentation	
	• MICCAI'23 tutorial on <i>Topology-Driven Image Analysis</i> , Vancouver	Oct. 2023
	Learning Topological Representations for Deep Image Understanding	
	• Department of CS, Florida State University	Apr. 2023
	• Department of BMI, Ohio State University	Mar. 2023
	• Department of CS, Rochester Institute of Technology	Feb. 2023
	• Department of ECE, University of California, Riverside	Feb. 2023
	• Athinoula A. Martinos Center for Biomedical Imaging, MGH/Harvard Medical School	Nov. 2022
	Learning Probabilistic Topological Representations Using Discrete Morse Theory	
	• Medical Imaging meets NeurIPS Workshop, New Orleans	Dec. 2022
	Topology-Informed Image Analysis	
	• Center for Computational Neuroscience, Flatiron Institute	Oct. 2022
	Topology-Aware Deep Image Segmentation	
	• Geometry and Topology meet Data Analysis and Machine Learning	Aug. 2021
	Topology-aware Segmentation Using Discrete Morse Theory	
	• International Conference on Learning Representations (ICLR)	May 2021
References	• Chao Chen Associate Professor, Stony Brook University chao.chen.1@stonybrook.edu https://chaochen.github.io/	
	• Dimitris Samaras SUNY Empire Innovation Professor, Stony Brook University samaras@cs.stonybrook.edu https://www3.cs.stonybrook.edu/~samaras/	
	• Fuxin Li Associate Professor, Oregon State University fuxin.li@oregonstate.edu https://web.engr.oregonstate.edu/~lif/	
	• Prateek Prasanna Assistant Professor, Stony Brook University prateek.prasanna@stonybrook.edu https://you.stonybrook.edu/imaginelab/	