

## Xiaoling Hu

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

- [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<sup>†</sup>, 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<sup>\*†</sup>, Xiaoling Hu<sup>\*</sup>, James Kaan, Michael Jin, Mutshipay Mpoy, Katherine Chung, Gagandeep Singh, Mary Saltz, Tahsin Kurc, Joel Saltz, Apostolos Tsisiopoulos, 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<sup>\*†</sup>, Xiaoling Hu<sup>\*</sup>, 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<sup>\*†</sup>, Xiaoling Hu<sup>\*</sup>, 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, <sup>†</sup> denotes students working closely with me)

- [1] **Semi-Supervised Contrastive VAE for Disentanglement of Digital Pathology Images**  
Mahmudul Hasan<sup>†</sup>, Xiaoling Hu, Shahira Abousamra, Prateek Prasanna, Joel Saltz, Chao Chen  
*Tech Report*
- [2] **Hard Negative Sample Mining for Whole Slide Image Classification**  
Wentao Huang<sup>†</sup>, 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<sup>†</sup>, Xiaoling Hu, Shahira Abousamra, Meilong Xu, Chao Chen  
*Tech Report*
- [6] **TopoSemiSeg: Enforcing Topological Consistency for Semi-Supervised Segmentation of Histopathology Images**  
Meilong Xu<sup>†</sup>, 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	<b>Deep Structural Reasoning for Biomedical Imaging</b>	
	• School of CAI, Arizona State University	Feb. 2024
	<b>Topology-Aware Deep Image Segmentation</b>	
	• MICCAI'23 tutorial on <i>Topology-Driven Image Analysis</i> , Vancouver	Oct. 2023
	<b>Learning Topological Representations for Deep Image Understanding</b>	
	• 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
	<b>Learning Probabilistic Topological Representations Using Discrete Morse Theory</b>	
	• Medical Imaging meets NeurIPS Workshop, New Orleans	Dec. 2022
	<b>Topology-Informed Image Analysis</b>	
	• Center for Computational Neuroscience, Flatiron Institute	Oct. 2022
	<b>Topology-Aware Deep Image Segmentation</b>	
	• Geometry and Topology meet Data Analysis and Machine Learning	Aug. 2021
	<b>Topology-aware Segmentation Using Discrete Morse Theory</b>	
	• International Conference on Learning Representations (ICLR)	May 2021
References	• <b>Chao Chen</b> Associate Professor, Stony Brook University chao.chen.1@stonybrook.edu <a href="https://chaochen.github.io/">https://chaochen.github.io/</a>	
	• <b>Dimitris Samaras</b> SUNY Empire Innovation Professor, Stony Brook University samaras@cs.stonybrook.edu <a href="https://www3.cs.stonybrook.edu/~samaras/">https://www3.cs.stonybrook.edu/~samaras/</a>	
	• <b>Fuxin Li</b> Associate Professor, Oregon State University fuxin.li@oregonstate.edu <a href="https://web.engr.oregonstate.edu/~lif/">https://web.engr.oregonstate.edu/~lif/</a>	
	• <b>Prateek Prasanna</b> Assistant Professor, Stony Brook University prateek.prasanna@stonybrook.edu <a href="https://you.stonybrook.edu/imaginelab/">https://you.stonybrook.edu/imaginelab/</a>	