

## 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> <b>Aug. 2023 - Present</b> <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>Biomedical 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></ul>
<b>Education</b>	<ul style="list-style-type: none"><li>• <b>Stony Brook University, Department of CS, USA</b> <b>Jan. 2018 - June 2023</b> <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> <b>Sep. 2014 - June 2017</b> <i>Master of Science</i></li><li>• <b>Huazhong University of Science and Technology, Department of EE, China</b> <b>Sep. 2010 - June 2014</b> <i>Bachelor of Science</i></li></ul>
<b>Selected Honors and Awards</b>	<ul style="list-style-type: none"><li>• Catacosinos Fellowship (2 out of 200+ PhD students in SBU CS Department), 2023</li><li>• NeurIPS travel award, 2019</li><li>• First-class Scholarship, Tsinghua University, 2016 (5%)</li></ul>
<b>Selected Publications</b>	<p>(* indicates equal contribution, <sup>†</sup> denotes students working closely with me)</p> <ul style="list-style-type: none"><li>[1] <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>[2] <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>[3] <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></ul>

- [4] **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%**)
- [5] **Confidence Estimation Using Unlabeled Data**  
 Chen Li<sup>†</sup>, Xiaoling Hu, Chao Chen  
*International Conference on Learning Representations (ICLR)*, 2023
- [6] **Structure-Aware Image Segmentation with Homotopy Warping**  
Xiaoling Hu  
*Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS)*, 2022
- [7] **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 Tassiopoulos, Prateek Prasanna, Chao Chen  
*European Conference on Computer Vision (ECCV)*, 2022 (**Oral, 2.7%**)
- [8] **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
- [9] **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
- [10] **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
- [11] **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%**)
- [12] **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
- [13] **Topology-Preserving Deep Image Segmentation**  
Xiaoling Hu, Li Fuxin, Dimitris Samaras, Chao Chen  
*Thirty-third Conference on Neural Information Processing Systems (NeurIPS)*, 2019
- [14] **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] <b>Spatial Diffusion for Object Layout Generation</b>	
	Chen Li <sup>†</sup> , <u>Xiaoling Hu</u> , Shahira Abousamra, Chao Chen	
	<i>Tech Report</i>	
	[2] <b>TopoSemiSeg: Enforcing Topological Consistency for Semi-Supervised Segmentation of Histopathology Images</b>	
	Meilong Xu <sup>†</sup> , <u>Xiaoling Hu</u> , Saumya Gupta, Shahira Abousamra, Chao Chen	
	<i>Tech Report</i>	
	[3] <b>Brain-ID: Learning Robust Feature Representations for Brain Imaging</b>	
	Peirong Liu, Oula Puonti, <u>Xiaoling Hu</u> , Daniel C. Alexander, Juan Eugenio Iglesias	
	<i>Tech Report</i>	
	[4] <b>Anomaly-Guided Weakly Supervised Lesion Segmentation on Retinal OCT Images</b>	
	Jiaqi Yang <sup>†</sup> , Gozde Merve Demirci <sup>†</sup> , <u>Xiaoling Hu</u> , Nitish Mehta, Meera Ramakrishnan, Mina Naguib, Chao Chen, Chialing Tsai	
	<i>Major revision for <b>Medical Image Analysis</b></i>	
	[5] <b>Deep Statistic Shape Model for Myocardium Segmentation</b>	
	<u>Xiaoling Hu</u> , Xiao Chen, Terrence Chen, Shanhui Sun	
	<i>Tech Report</i>	
Experiences	<b>Stony Brook University, Department of CS, USA</b>	<b>Sep. 2018 - June 2023</b>
	<i>Research Assistant</i>	
	Advisor: <i>Prof.</i> Chao Chen	
	<ul style="list-style-type: none"> <li>• Topological Data Analysis</li> <li>• Computer Vision, Medical Imaging</li> <li>• Robust Machine Learning</li> </ul>	
	<b>Allen Institute, USA</b>	<b>May 2022 - Aug. 2022</b>
	<i>Research Intern</i>	
	Mentor: <i>Dr.</i> Matheus Viana	
	<ul style="list-style-type: none"> <li>• Topology-Aware Image Segmentation</li> </ul>	
	<b>United Imaging Intelligence (UII), USA</b>	<b>May 2021 - Aug. 2021</b>
	<i>Research Intern</i>	
	Mentor: <i>Dr.</i> Shanhui Sun	
	<ul style="list-style-type: none"> <li>• Deep Shape Model Based Network</li> </ul>	
	<b>Tencent Youtu Lab, China</b>	<b>Jun. 2017 - Jan. 2018</b>
	<i>Research Intern</i>	
	Mentor: <i>Dr.</i> Yuwing Tai	
	<ul style="list-style-type: none"> <li>• Clothes Detection, Attribute Prediction</li> </ul>	
Skills	<ul style="list-style-type: none"> <li>• <b>Languages:</b> C/C++, Matlab, Python, Lua, Java</li> <li>• <b>OS:</b> Linux, Mac OS, Windows</li> <li>• <b>Tools:</b> Caffe, Torch, Tensorflow, PyTorch, OpenCV</li> </ul>	

## Mentoring

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

## Service

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

## Talks

### Topology-Aware Deep Image Segmentation

- MICCAI’23 tutorial on *Topology-Driven Image Analysis*, 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 (GTDAML), Online, Aug. 2021

### **Topology-aware Segmentation Using Discrete Morse Theory**

- International Conference on Learning Representations (ICLR), Online, May 2021

### **References**

- **Chao Chen**  
Associate Professor, Stony Brook University  
[chao.chen.1@stonybrook.edu](mailto:chao.chen.1@stonybrook.edu)  
<https://chaochen.github.io/>
- **Dimitris Samaras**  
SUNY Empire Innovation Professor, Stony Brook University  
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- **Fuxin Li**  
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- **Prateek Prasanna**  
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