

## Xiaoling Hu

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**Current Position** • **Harvard Medical School, Athinoula A. Martinos Center for Biomedical Imaging, USA** **Aug. 2023 - Present**

*Postdoctoral Research Fellow*

- Hosted by Prof. Juan Eugenio Iglesias and Prof. Bruce Fischl

**Research Interests** My research interest is **Biomedical AI**, which lies in the intersection of medical imaging, computer vision and machine learning. In particular, I am interested in:

- **Topology-Driven Deep Image Analysis**
- **Uncertainty Estimation and Its Applications**
- **Learning with Imperfect Data**

**Education** • **Stony Brook University, Department of CS, USA** **Jan. 2018 - Aug. 2023**

*Doctor of Philosophy*

- 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**

*Master of Science*

• **Huazhong University of Science and Technology, Department of EE, China**

**Sep. 2010 - June 2014**

*Bachelor of Science*

**Selected Publications** (\* indicates equal contribution, <sup>†</sup> denotes students working closely with me)

[1] **Topology-Aware Uncertainty for Image Segmentation**

Saumya Gupta<sup>†</sup>, Yikai Zhang, Xiaoling Hu, Prateek Prasanna, Chao Chen

*Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*, 2023

[2] **Calibrating Uncertainty for Semi-Supervised Crowd Counting**

Chen Li<sup>†</sup>, Xiaoling Hu, Shahira Abousamra, Chao Chen

*International Conference on Computer Vision (ICCV)*, 2023

[3] **Enhancing Modality-Agnostic Representations via Meta-Learning for Brain Tumor Segmentation**

Aishik Konwer<sup>†</sup>, Xiaoling Hu, Xuan Xu, Joseph Bae, Chao Chen, Prateek Prasanna

*International Conference on Computer Vision (ICCV)*, 2023

[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, † denotes students working closely with me)

- [1] **Anomaly-Guided Weakly Supervised Lesion Segmentation on Retinal OCT Images**  
 Jiaqi Yang<sup>†</sup>, Gozde Merve Demirci<sup>†</sup>, Xiaoling Hu, Nitish Mehta, Meera Ramakrishnan, Mina Naguib, Chao Chen, Chialing Tsai  
*Major revision for Medical Image Analysis*
- [2] **Deep Statistic Shape Model for Myocardium Segmentation**  
Xiaoling Hu, Xiao Chen, Terrence Chen, Shanhui Sun  
*Tech Report*

<b>Selected Honors and Awards</b>	<ul style="list-style-type: none"> <li>• Catacosinos Fellowship (2 out of 200+ PhD students), 2023</li> <li>• NeurIPS travel award, 2019</li> <li>• First-class Scholarship, Tsinghua University, 2016 (5%)</li> </ul>	
<b>Experiences</b>	<b>Stony Brook University, Department of CS, USA</b> <i>Research Assistant</i> Advisor: <i>Prof. Chao Chen</i>	<b>Sep. 2018 - Aug. 2023</b>
	<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> <i>Summer Consultant</i> Mentor: <i>Dr. Matheus Viana</i>	<b>May 2022 - Aug. 2022</b>
	<ul style="list-style-type: none"> <li>• Topology-Aware Image Segmentation</li> </ul>	
	<b>United Imaging Intelligence (UII), USA</b> <i>Research Intern</i> Mentor: <i>Dr. Shanhui Sun</i>	<b>May 2021 - Aug. 2021</b>
	<ul style="list-style-type: none"> <li>• Deep Shape Model Based Network</li> </ul>	
	<b>Tencent Youtu Lab, China</b> <i>Research Intern</i> Mentor: <i>Dr. Yuwing Tai</i>	<b>Jun. 2017 - Jan. 2018</b>
	<ul style="list-style-type: none"> <li>• Clothes Detection, Attribute Prediction</li> </ul>	
<b>Skills</b>	<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>	
<b>Mentoring</b>	<ul style="list-style-type: none"> <li>• Jiaqi Yang, Ph.D Student at Department of CS, CUNY</li> <li>• Chen Li, Ph.D Student at Department of BMI, Stony Brook University</li> <li>• Saumya Gupta, Ph.D Student at Department of CS, Stony Brook University</li> <li>• Gözde Merve DEMIRCI, Ph.D Student at Department of CS, CUNY</li> <li>• Meilong Xu, Ph.D Student at Department of CS, Stony Brook University</li> <li>• Chen Li, Ph.D Student at Department of CS, Stony Brook University</li> <li>• John Xie, High School Student (Summer 2021) → University of Michigan</li> </ul>	
<b>Service</b>	<ul style="list-style-type: none"> <li>• Reviewer, International Conference on Machine Learning (ICML)</li> <li>• Reviewer, International Conference on Learning Representations (ICLR)</li> <li>• Reviewer, Conference on Neural Information Processing Systems (NeurIPS)</li> <li>• Reviewer, Computer Vision and Pattern Recognition (CVPR)</li> <li>• Reviewer, European Conference on Computer Vision (ICCV)</li> <li>• Reviewer, European Conference on Computer Vision (ECCV)</li> <li>• Reviewer, Winter Conference on Applications of Computer Vision (WACV)</li> </ul>	

- 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  
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<https://chaochen.github.io/>
- **Dimitris Samaras**  
SUNY Empire Innovation Professor, Stony Brook University  
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- **Fuxin Li**  
Associate Professor, Oregon State University  
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