

## 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**, and I am focusing on developing core AI/ML algorithms applied to medical imaging problems. 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 - June 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 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%)
- Selected Publications**
- (\* indicates equal contribution, † denotes students working closely with me)
- [1] **Anomaly-Guided Weakly Supervised Lesion Segmentation on Retinal OCT Images**  
Jiaqi Yang<sup>†</sup>, Nitish Mehta, Gozde Merve Demirci<sup>†</sup>, Xiaoling Hu, Meera Ramakrishnan, Mina Naguib, Chao Chen, Chialing Tsai  
*Accepted with Minor Revision for **Medical Image Analysis**, 2024*
  - [2] **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*
  - [3] **Calibrating Uncertainty for Semi-Supervised Crowd Counting**  
Chen Li<sup>†</sup>, Xiaoling Hu, Shahira Abousamra, Chao Chen  
*International Conference on Computer Vision (**ICCV**), 2023*

- [4] **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
- [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 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<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, † denotes students working closely with me)

[1] **Spatial Diffusion for Object Layout Generation**

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

*Tech Report*

[2] **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*

[3] **Brain-ID: Learning Robust Feature Representations for Brain Imaging**

Peirong Liu, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan Eugenio Iglesias

*Tech Report*

[4] **Deep Statistic Shape Model for Myocardium Segmentation**

Xiaoling Hu, Xiao Chen, Terrence Chen, Shanhui Sun

*Tech Report*

## Experiences

**Stony Brook University, Department of CS, USA**

**Sep. 2018 - June 2023**

*Research Assistant*

Advisor: *Prof.* Chao Chen

- Topological Data Analysis
- Computer Vision, Medical Imaging
- Robust Machine Learning

**Allen Institute, USA**

**May 2022 - Aug. 2022**

*Research Intern*

Mentor: *Dr.* Matheus Viana

- Topology-Aware Image Segmentation

**United Imaging Intelligence (UII), USA**

**May 2021 - Aug. 2021**

*Research Intern*

Mentor: *Dr.* Shanhui Sun

- Deep Shape Model Based Network

**Tencent Youtu Lab, China**

**Jun. 2017 - Jan. 2018**

*Research Intern*

Mentor: *Dr.* Yuwing Tai

- Clothes Detection, Attribute Prediction

## Skills

- **Languages:** C/C++, Matlab, Python, Lua, Java
- **OS:** Linux, Mac OS, Windows
- **Tools:** Caffe, Torch, Tensorflow, PyTorch, OpenCV

## 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  
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<https://chaochen.github.io/>
- **Dimitris Samaras**  
SUNY Empire Innovation Professor, Stony Brook University  
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<https://www3.cs.stonybrook.edu/~samaras/>
- **Fuxin Li**  
Associate Professor, Oregon State University  
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- **Prateek Prasanna**  
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