

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, [†] denotes students working closely with me)

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

Saumya Gupta[†], 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[†], 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[†], 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[†], 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^{*†}, 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%**)
- [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^{*†}, Xiaoling Hu^{*}, 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^{*†}, Xiaoling Hu^{*}, 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[†], Gozde Merve Demirci[†], 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

Selected Honors and Awards	<ul style="list-style-type: none"> • Catacosinos Fellowship (2 out of 200+ PhD students), 2023 • NeurIPS travel award, 2019 • First-class Scholarship, Tsinghua University, 2016 (5%) 	
Experiences	Stony Brook University, Department of CS, USA <i>Research Assistant</i> Advisor: <i>Prof. Chao Chen</i>	Sep. 2018 - Aug. 2023
	<ul style="list-style-type: none"> • Topological Data Analysis • Computer Vision, Medical Imaging • Robust Machine Learning 	
	Allen Institute, USA <i>Summer Consultant</i> Mentor: <i>Dr. Matheus Viana</i>	May 2022 - Aug. 2022
	<ul style="list-style-type: none"> • Topology-Aware Image Segmentation 	
	United Imaging Intelligence (UII), USA <i>Research Intern</i> Mentor: <i>Dr. Shanhui Sun</i>	May 2021 - Aug. 2021
	<ul style="list-style-type: none"> • Deep Shape Model Based Network 	
	Tencent Youtu Lab, China <i>Research Intern</i> Mentor: <i>Dr. Yuwing Tai</i>	Jun. 2017 - Jan. 2018
	<ul style="list-style-type: none"> • Clothes Detection, Attribute Prediction 	
Skills	<ul style="list-style-type: none"> • Languages: C/C++, Matlab, Python, Lua, Java • OS: Linux, Mac OS, Windows • Tools: Caffe, Torch, Tensorflow, PyTorch, OpenCV 	
Service	<ul style="list-style-type: none"> • 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

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