

Xiaoling Hu

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Current Position	<ul style="list-style-type: none">• Harvard Medical School, Athinoula A. Martinos Center for Biomedical Imaging, USA Aug. 2023 - Present <i>Postdoctoral Research Fellow</i> - Hosted by Prof. Juan Eugenio Iglesias and Prof. Bruce Fischl
Research Interests	<p>My research interest is Medical AI, 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">• Topology-Driven Deep Image Analysis• Uncertainty Estimation and Its Applications• Learning with Imperfect Data• Biomedical Applications
Education	<ul style="list-style-type: none">• Stony Brook University, Department of CS, USA 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• Tsinghua University, Department of EE, China Sep. 2014 - June 2017 <i>Master of Science</i>• Huazhong University of Science and Technology, Department of EE, China Sep. 2010 - June 2014 <i>Bachelor of Science</i>
Selected Publications	<p>(* indicates equal contribution, [†] denotes students working closely with me)</p> <ul style="list-style-type: none">[1] Semi-Supervised Contrastive VAE for Disentanglement of Digital Pathology Images Mahmudul Hasan[†], <u>Xiaoling Hu</u>, Shahira Abousamra, Prateek Prasanna, Joel Saltz, Chao Chen <i>International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)</i>, 2024[2] Hard Negative Sample Mining for Whole Slide Image Classification Wentao Huang[†], <u>Xiaoling Hu</u>, Shahira Abousamra, Prateek Prasanna, Chao Chen <i>International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)</i>, 2024[3] Spatial Diffusion for Cell Layout Generation Chen Li[†], <u>Xiaoling Hu</u>, Shahira Abousamra, Meilong Xu, Chao Chen <i>International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)</i>, 2024

- [4] **Anomaly-Guided Weakly Supervised Lesion Segmentation on Retinal OCT Images**
Jiaqi Yang[†], Nitish Mehta, Gozde Merve Demirci[†], Xiaoling Hu, Meera Ramakrishnan, Mina Naguib, Chao Chen, Chialing Tsai
Medical Image Analysis (MedIA), 2024
- [5] **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
- [6] **Calibrating Uncertainty for Semi-Supervised Crowd Counting**
Chen Li[†], Xiaoling Hu, Shahira Abousamra, Chao Chen
International Conference on Computer Vision (ICCV), 2023
- [7] **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
- [8] **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%**)
- [9] **Confidence Estimation Using Unlabeled Data**
Chen Li[†], Xiaoling Hu, Chao Chen
International Conference on Learning Representations (ICLR), 2023
- [10] **Structure-Aware Image Segmentation with Homotopy Warping**
Xiaoling Hu
Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS), 2022
- [11] **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%**)
- [12] **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
- [13] **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
- [14] **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

- [15] **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%**)
- [16] **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
- [17] **Topology-Preserving Deep Image Segmentation**
Xiaoling Hu, Li Fuxin, Dimitris Samaras, Chao Chen
Thirty-third Conference on Neural Information Processing Systems (NeurIPS), 2019
- [18] **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] **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
- [2] **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
- [3] **TopoSemiSeg: Enforcing Topological Consistency for Semi-Supervised Segmentation of Histopathology Images**
 Meilong Xu[†], Xiaoling Hu, Saumya Gupta, Shahira Abousamra, Chao Chen
Tech Report
- [4] **Brain-ID: Learning Robust Feature Representations for Brain Imaging**
 Peirong Liu, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan Eugenio Iglesias
Tech Report
- [5] **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	<ul style="list-style-type: none"> • Allen Institute, USA May 2022 - Aug. 2022 <i>Research Intern</i> Mentor: <i>Dr. Matheus Viana</i> Topic: Topology-Aware Image Segmentation
	<ul style="list-style-type: none"> • United Imaging Intelligence (UII), USA May 2021 - Aug. 2021 <i>Research Intern</i> Mentor: <i>Dr. Shanhui Sun</i> Topic: Deep Shape Model Based Network
	<ul style="list-style-type: none"> • Tencent Youtu Lab, China Jun. 2017 - Jan. 2018 <i>Research Intern</i> Mentor: <i>Dr. Yuwing Tai</i> Topic: Clothes Detection, Attribute Prediction
Mentoring	<ul style="list-style-type: none"> • Jiaqi Yang (MICCAI'21, ISBI'21, MedIA'24), Ph.D. student at Department of CS, CUNY Since Spring 2020
	<ul style="list-style-type: none"> • Chen Li (ICLR'23, ICCV'23, MICCAI'24), Ph.D. student at Department of BMI, Stony Brook University Since Fall 2021
	<ul style="list-style-type: none"> • Meilong Xu, Ph.D. student at Department of CS, Stony Brook University Since Summer 2023
	<ul style="list-style-type: none"> • Wentao Huang (MICCAI'24), Ph.D. student at Department of CS, Stony Brook University Since Summer 2023
	<ul style="list-style-type: none"> • Mahmudul Hasan (MICCAI'24), Ph.D. student at Department of CS, Stony Brook University Summer 2023
	<ul style="list-style-type: none"> • Saumya Gupta (ECCV'22, NeurIPS'23), Ph.D. student at Department of CS, Stony Brook University Fall 2021 – Summer 2023
	<ul style="list-style-type: none"> • John Xie, High School student → University of Michigan Summer 2021
Professional Service	Organizer <ul style="list-style-type: none"> • MICCAI'24 workshop on <i>The First Workshop on Topology- and Graph-Informed Imaging Informatics (TGI3)</i> 2024 • MICCAI'23 tutorial on <i>Topology-Driven Image Analysis</i> 2023
	Reviewing <ul style="list-style-type: none"> • 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

Deep Structural Reasoning for Biomedical Imaging

- School of CAI, Arizona State University Feb. 2024

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 Aug. 2021

Topology-aware Segmentation Using Discrete Morse Theory

- International Conference on Learning Representations (ICLR) May 2021

References

- **Chao Chen**
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