

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 Biomedical AI, which lies in the intersection of medical imaging, computer vision and machine learning. 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 |
| Education | <ul style="list-style-type: none">• Stony Brook University, Department of CS, USA Jan. 2018 - Aug. 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 Honors and Awards | <ul style="list-style-type: none">• 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 | <p>(* indicates equal contribution, [†] denotes students working closely with me)</p> <ul style="list-style-type: none">[1] Topology-Aware Uncertainty for Image Segmentation Saumya Gupta[†], Yikai Zhang, <u>Xiaoling Hu</u>, Prateek Prasanna, Chao Chen <i>Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)</i>, 2023[2] Calibrating Uncertainty for Semi-Supervised Crowd Counting Chen Li[†], <u>Xiaoling Hu</u>, Shahira Abousamra, Chao Chen <i>International Conference on Computer Vision (ICCV)</i>, 2023[3] Enhancing Modality-Agnostic Representations via Meta-Learning for Brain Tumor Segmentation Aishik Konwer[†], <u>Xiaoling Hu</u>, Xuan Xu, Joseph Bae, Chao Chen, Prateek Prasanna <i>International Conference on Computer Vision (ICCV)</i>, 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

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| Preprints | (* indicates equal contribution, [†] denotes students working closely with me) | |
| | <p>[1] Anomaly-Guided Weakly Supervised Lesion Segmentation on Retinal OCT Images Jiaqi Yang[†], Gozde Merve Demirci[†], <u>Xiaoling Hu</u>, Nitish Mehta, Meera Ramakrishnan, Mina Naguib, Chao Chen, Chialing Tsai <i>Major revision for Medical Image Analysis</i></p> <p>[2] Deep Statistic Shape Model for Myocardium Segmentation <u>Xiaoling Hu</u>, Xiao Chen, Terrence Chen, Shanhui Sun <i>Tech Report</i></p> | |
| Experiences | Stony Brook University, Department of CS, USA <i>Research Assistant</i> Advisor: <i>Prof.</i> Chao Chen | Sep. 2018 - Aug. 2023 |
| | <ul style="list-style-type: none"> • Topological Data Analysis • Computer Vision, Medical Imaging • Robust Machine Learning | |
| | Allen Institute, USA <i>Research Intern</i> Mentor: <i>Dr.</i> Matheus Viana | 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.</i> Shanhui Sun | May 2021 - Aug. 2021 |
| 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 | |
| | Tencent Youtu Lab, China <i>Research Intern</i> Mentor: <i>Dr.</i> Yuwing Tai | Jun. 2017 - Jan. 2018 |
| | <ul style="list-style-type: none"> • Clothes Detection, Attribute Prediction | |
| Mentoring | <ul style="list-style-type: none"> • 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, High School Student (Summer 2021) → 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), On-line, 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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- **Dimitris Samaras**
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