Xiaoling Hu

**E-mail**: xihu3@mgh.harvard.edu, **Mobile**: 6312028413
**Website**: [https://huxiaoling.github.io/](https://huxiaoling.github.io/)

**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 **Medical 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**
  - **Brain Image Analysis**

**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 Publications**
(* indicates equal contribution, † denotes students working closely with me)

1. **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

2. **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

3. **Calibrating Uncertainty for Semi-Supervised Crowd Counting**
   - Chen Li†, 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†, 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†, 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*†, Xiaoling Hu*, James Kaan, Michael Jin, Mutshipay Mpoy, Katherine Chung, Gagandeep Singh, Mary Saltz, Tahsin Kurc, Joel Saltz, Apostolos Tasiopoulos, 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*†, Xiaoling Hu*, 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*†, Xiaoling Hu*, 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. **Semi-Supervised Contrastive VAE for Disentanglement of Digital Pathology Images**
   Mahmudul Hasan†, Xiaoling Hu, Shahira Abousamra, Prateek Prasanna, Joel Saltz, Chao Chen
   Tech Report

2. **Hard Negative Sample Mining for Whole Slide Image Classification**
   Wentao Huang†, Xiaoling Hu, Shahira Abousamra, Prateek Prasanna, Chao Chen
   Tech Report

3. **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

4. **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

5. **Spatial Diffusion for Cell Layout Generation**
   Chen Li†, Xiaoling Hu, Shahira Abousamra, Meilong Xu, Chao Chen
   Tech Report

6. **TopoSemiSeg: Enforcing Topological Consistency for Semi-Supervised Segmentation of Histopathology Images**
   Meilong Xu†, Xiaoling Hu, Saumya Gupta, Shahira Abousamra, Chao Chen
   Tech Report

7. **Brain-ID: Learning Robust Feature Representations for Brain Imaging**
   Peirong Liu, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan Eugenio Iglesias
   Tech Report

8. **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

- Allen Institute, USA
  Research Intern
  Mentor: Dr. Matheus Viana
  Topic: Topology-Aware Image Segmentation

- United Imaging Intelligence (UII), USA
  Research Intern
  Mentor: Dr. Shanhui Sun
  Topic: Deep Shape Model Based Network
**Tencent Youtu Lab, China**
*Research Intern*
Jun. 2017 - Jan. 2018

**Mentor:** Dr. Yuwing Tai
**Topic:** Clothes Detection, Attribute Prediction

**Mentoring**
- Jiaqi Yang (*MICCAI’21, ISBI’21, MedIA’24*), Ph.D Candidate at Department of CS, CUNY Since Spring 2020
- Chen Li (*ICLR’23, ICCV’23*), Ph.D Candidate at Department of BMI, Stony Brook University Since Fall 2021
- Saumya Gupta (*ECCV’22, NeurIPS’23*), Ph.D Candidate at Department of CS, Stony Brook University Fall 2021 – Summer 2023
- Meilong Xu, Ph.D Student at Department of CS, Stony Brook University Since Summer 2023
- Wentao Huang, Ph.D Student at Department of CS, Stony Brook University Since Summer 2023
- John Xie, High School Student → University of Michigan Summer 2021

**Professional Service**

**Organizer**
- MICCAI’24 workshop on *The First Workshop on Topology- and Graph-Informed Imaging Informatics (TGI3)* 2024
- MICCAI’23 tutorial on *Topology-Driven Image Analysis* 2023

**Reviewing**
- 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)
- 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**
  Associate Professor, Stony Brook University
  chao.chen.1@stonybrook.edu
  [https://chaochen.github.io/](https://chaochen.github.io/)

- **Dimitris Samaras**
  SUNY Empire Innovation Professor, Stony Brook University
  samaras@cs.stonybrook.edu
  [https://www3.cs.stonybrook.edu/~samaras/](https://www3.cs.stonybrook.edu/~samaras/)

- **Fuxin Li**
  Associate Professor, Oregon State University
  fuxin.li@oregonstate.edu
  [https://web.engr.oregonstate.edu/~lif/](https://web.engr.oregonstate.edu/~lif/)

- **Prateek Prasanna**
  Assistant Professor, Stony Brook University
  prateek.prasanna@stonybrook.edu
  [https://you.stonybrook.edu/imaginelab/](https://you.stonybrook.edu/imaginelab/)