

Han Liu

Curriculum Vitae

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[Homepage](#) | [GitHub](#) | [Google Scholar](#)

Education

2019-2024 **Vanderbilt University**

Ph.D. in Computer Science

Advisors: Ipek Oguz, Benoit M. Dawant

2016-2017 **Yale University**

M.S. in Biomedical Engineering

Advisor: James S. Duncan

2012-2016 **Rensselaer Polytechnic Institute**

B.S. in Biomedical Engineering & Electrical Engineering

Advisor: Ge Wang

Skills

- **Medical Image Processing and Analysis:** Solid knowledge and hands-on experience on deep learning-based methods for medical image classification, segmentation, object detection and registration.
- **Programming Languages:** Python, MATLAB, C++, HTML
- **Machine Learning Libraries:** PyTorch, Scikit-Learn, SciPy
- **Image Processing Software:** MONAI, SimpleITK, ANTs, ITK-SNAP, 3D Slicer, OpenCV
- **Communication:** 4+ years' experience working closely with doctors and surgeons.

Experience

Department of Computer Science, Vanderbilt University, Nashville, TN

Research Assistant, Sep 2019-Present

- Developed a novel method to improve the widely used modality dropout method for Multiple Sclerosis lesion segmentation. The developed method helped to tackle the missing modality issue when dealing with heterogenous modality MRI images collected across different institutions.
- Developed an automatic method to segment vestibular schwannoma and cochlea in high-resolution T2 MRI images in an unsupervised domain adaptation setting. Our proposed method achieved the 4th place during the final evaluation period in the MICCAI 2021 CrossMoDA challenge.
- Developed a deep-learning based method using conditional Generative Adversarial Networks to generate synthetic CT skull from T1-w MRI images for Transcranial MR Imaging-Guided Focused Ultrasound Interventions.

- Performed an extensive comparative study to explore the effectiveness of various localization algorithms for Deep Brain Stimulation as well as intra- and inter-rater variability analysis across two institutions.
- Developed a deep learning-based method for automatic target localization in Deep Brain Stimulation procedures for epilepsy patients. Uncertainty estimation was performed to detect unreliable predictions during inference phase.

Teaching Assistant, Sep 2019-Present

- Achieved an overall TA score of 4.83, where the average score for TAs is 4.08.
- Courses:
 - Intermediate Software Design (C++)
 - Prog. and Prob. Solv. with Python (Python)
 - Advanced Medical Image Processing (MATLAB)
 - Foundations of Machine Learning (Python)
 - Projects in Machine Learning (Python)

Imaging Research Lab, Pittsburgh University, Pittsburgh, PA

Research Associate, Sep 2017- June 2019

- Developed a novel deep learning-based thoracic disease classification method which improved the classification performances consistently for all 14 diseases and provided better interpretability compared to the previous state-of-the-art method.
- Developed an automatic object detection method for pneumonia detection. The proposed method achieved 25th place in the RSNA Pneumonia Detection Challenge 2018.
- Assisted in developing an automatic optic disc/cup segmentation algorithm and a glaucoma severity assessment method in colored fundus images.

Image Processing and Analysis Group, Yale University, New Haven, CT

Research Assistant, Sep 2016-May 2017

- Developed a dictionary learning method for segmentation of myocardium and blood pool in left ventricle from echocardiography.
- Developed a liver tumor segmentation in multiparametric MR images using Gaussian Mixture Model.

Publications

1. **Liu, H.**, Fan, Y., Cui, C., Su, D., McNeil, A., & Dawant, B. M. (2022). Unsupervised Domain Adaptation for Vestibular Schwannoma and Cochlea Segmentation via Semi-supervised Learning and Label Fusion. Under review in BrainLes 2021 MICCAI Workshop.
2. **Liu, H.**, Holloway, K. L., Englot, D. J., & Dawant, B. M. (2022). A Multi-rater Comparative Study of Automatic Target Localization Methods for Epilepsy Deep Brain Stimulation Procedures. Accepted by Medical Imaging 2022.
3. **Liu, H.**, Sigona, M. K., Chen, L., Caskey, C. F., & Dawant, B. M. (2022). Synthetic CT Skull Generation for Transcranial MR Imaging-Guided Focused Ultrasound Interventions with Conditional Adversarial Networks. Accepted by *Medical Imaging 2022*.

4. **Liu, H.**, Fan, Y., Cui, C., Su, D., McNeil, A., & Dawant, B. M. (2021). Cross-Modality Domain Adaptation for Vestibular Schwannoma and Cochlea Segmentation. *arXiv preprint arXiv:2109.06274*.
5. Cui, C., **Liu, H.**, Englot, D. J., & Dawant, B. M. (2021, February). Brain vessel segmentation in contrast-enhanced T1-weighted MR Images for deep brain stimulation of the anterior thalamus using a deep convolutional neural network. In *Medical Imaging 2021: Image-Guided Procedures, Robotic Interventions, and Modeling* (Vol. 11598, p. 115980K). International Society for Optics and Photonics.
6. **Liu, H.**, Cui, C., Englot, D. J., & Dawant, B. M. (2020). Uncertainty Estimation in Medical Image Localization: Towards Robust Anterior Thalamus Targeting for Deep Brain Stimulation. In *Interpretable and Annotation-Efficient Learning for Medical Image Computing* (pp. 130-137). Springer, Cham.
7. **Liu, H.**, Wang, L., Nan, Y., Jin, F., Wang, Q., & Pu, J. (2019). SDFN: Segmentation-based deep fusion network for thoracic disease classification in chest X-ray images. *Computerized Medical Imaging and Graphics*, 75, 66-73.
8. Zhao, W., **Liu, H.**, Leader, J. K., Wilson, D., Meng, X., Wang, L., ... & Pu, J. (2019). Computerized identification of the vasculature surrounding a pulmonary nodule. *Computerized Medical Imaging and Graphics*, 74, 1-9.
9. Wang, L., **Liu, H.**, Lu, Y., Chen, H., Zhang, J., & Pu, J. (2019). A coarse-to-fine deep learning framework for optic disc segmentation in fundus images. *Biomedical signal processing and control*, 51, 82-89.
10. Wang, L., **Liu, H.**, Zhang, J., Chen, H., & Pu, J. (2019, March). Computerized assessment of glaucoma severity based on color fundus images. In *Medical Imaging 2019: Biomedical Applications in Molecular, Structural, and Functional Imaging* (Vol. 10953, p. 1095322). International Society for Optics and Photonics.
11. Wang, L., **Liu, H.**, Zhang, J., Chen, H., & Pu, J. (2019, March). Automated segmentation of the optic disc using the deep learning. In *Medical Imaging 2019: Image Processing* (Vol. 10949, p. 1094923). International Society for Optics and Photonics.

Honors & Awards

2019-2023 IBM fellowship

2012-2015 Dean's List, Rensselaer Polytechnic Institute.

Professional Activities

Journal Reviewer

- IEEE Journal of Biomedical and Health Informatics (JBHI)
- Computers in Biology and Medicine (CIBM)
- Computerized Medical Imaging and Graphics (CMIG)
- Neurocomputing
- BioMed Research International

Conference Reviewer

- KDD 2021