

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 modality dropout method to tackle the missing modality issue for Multiple Sclerosis lesion segmentation.
- 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