

Hyeon Woo Lee

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TECHNICAL SKILLS

- Deep Learning: PyTorch, TensorFlow, Keras, CNN, Transformers, LSTM, Computer Vision
- Cloud Development Toolkits: Docker, AWS, HSDP, CUDA
- Programming Language: Python(Scikit-learn, Numpy, Pandas), C/C++, MATLAB, R, HTML, CSS, SQL

PROFESSIONAL EXPERIENCE

Research Data Scientist, *Ultrasound AI group, Philips*

July 2020 ~ Present

- Deep learning algorithm development for FAST ultrasound exam on mobile ultrasound system: [Lumify](#)
 - Successfully passed internal concept selection & validation process for AI solution deployment to Philips ultrasound system (preparing validations study for FDA 510(k) clearance)
 - Developed real-time key organ detection and intra-abdominal free fluid segmentation model
- Leading development of middle cerebral arteries (MCA) detection model for Transcranial Doppler ultrasound
 - Collaborated with MIT and BIDMC for volunteer & patient study and data annotation
 - Developed real-time MCA detection model for intracranial pressure estimation in 3D ultrasound images
- Developed and implemented state-of-the-art models including variants of YOLO, U-Net, DETR, and GAN
 - Utilized Multi-Task Learning, Weakly-Supervised Learning, Domain Adaptation, and Generative models
- Semantic analysis of radiology report using CheXpert NLP tool
- Developed internal ML model development workflow that is now used by multiple project teams
 - Data extraction, statistical analysis, transformation & load, and model performance evaluation toolbox
 - Active learning to select unlabeled data with high uncertainty for annotation
- Authored 10+ invention disclosures (7 provisional patent filed) on AI in healthcare
- Collaborated with UI/UX designer to develop point-of-care-ultrasound workflow and showcased to key customers
- Promoted to higher grade of research scientist on May 2022

Scientific Data Engineer, *Allen Institute for Cell Science, Allen Institute*

July 2019 ~ July 2020

- Developed computer vision open source toolkit for microscopic cell images, [Allen Cell Structural Segmenter](#).
- Worked on classical segmentation methods to generate pseudo-label for the iterative learning.
- Developed a cell pair (mitotic cell) detector by implementing Faster-RCNN with Pytorch.
- Using spatial data augmentation and DeeplabV3+, I developed a 2D segmentation model for cardiomyocyte cell analysis in published paper at Cell Systems
- Worked on a conditional GAN that transfers 3D microscopic images between different magnification, different microscopic objects, different resolution, and different light microscope modalities.

EDUCATION

Cornell University, College of Engineering, Ithaca, NY

May 2019

Master of Engineering in Biomedical Engineering (Machine Learning Research Track. Advised by Dr. Sabuncu)

University of Rochester, College of Engineering, Rochester, NY

December 2017

Bachelor of Science in Biomedical Engineering (Electrical Engineering Concentration)

ACADEMIC RESEARCH EXPERIENCE

Graduate Research Assistant, *Sabuncu Lab, Cornell University*

August 2018 – June 2019

- Biomedical image segmentation in the scenario of only a few labeled brain MR images.
- Developed a multi-atlas segmentation (MAS) model for 3D Brain MRI segmentation.
- Proposed a novel method, MAS with semi-supervised learning-based registration.
- MAS with semi-supervised based registration in a low supervised setting was presented at Neurips ML4H 2019.

CONFERENCE & JOURNAL PUBLICATIONS

H. Lee, M. Zahiri, G. Goutam, et al

“Automated Anatomical Feature Detection for Completeness of Abdominal FAST Exam”
IEEE International Ultrasonics Symposium (IUS), 2023, Accepted

K.A. Gerbin, T. Grancharova, R. M. Donovan-Maiye, M.C. Hendershott, ... , **H. Lee**, et al

“Cell states beyond transcriptomics: integrating structural organization and gene expression in hiPSC-derived cardiomyocytes”
Cell Systems, Volume 12. Issue 6. pp 680-687. 2021

J. Chen, L. Ding, M. P. Viana, **H. Lee**, et al

“The Allen Cell and Structure Segmenter: a new open source toolkit for segmenting 3D intracellular structures in fluorescence microscopy images”
bioRxiv, 2020

H.W. Lee, M. R. Sabuncu, and A. V. Dalca.

“Few Labeled Atlases are Necessary for Deep-Learning-Based Segmentation”
NeurIPS ML4H: Machine Learning for Health, 2019 [Acc. rate: 26.1%]

PATENTS

C. Christopher, X. Mandy, F. Jonathan, P. Payaal, ... , **H. Lee**

“Graphical User Interface for Providing Ultrasound Imaging Guidance”
US published patent: US-20230320694-A. Oct 2023

CONFERENCE ABSTRACTS

“Development of a real time organ feature detection to enhance learning and completeness of abdominal FAST exam”
N.Schnittke, **H. Lee**, C. Gregory, B. Hicks, et al
Society of Academic Emergency Medicine (SAEM), Oral Presentation, May 2023

“Automated ultrasound methods for cerebral blood flow velocity measurement in point-of-care settings”
J. Fincke, J. Sutton, S. Kyne, R. S. Naidu, **H. Lee**, T. Heldt, B. I. Raju,
International Symposium on Intracranial pressure and Brain Monitoring, Cape Town, South Africa, 2022

“Artificial Intelligence model to identify organ features for guiding FAST ultrasound exam”

H. Lee, N. Schnittke, J. Fincke, et al

American College of Emergency Physicians (ACEP), Annals of Emergency Medicine 80.4 (2022): S19.

“AI Assistance to Acquire High-Quality FAST Exams”

M. U. Ghani, **H. Lee**, J. Fincke, G. Ghoshal, M. Zahiri, et al

Military Health System Research Symposium (MHSRS). Poster Presentation. September 2022

ACADEMIC SERVICE

IEEE Engineering in Medicine and Biology Society (EMBC) Reviewer

2023

HONORS & AWARDS

NeurIPS ML4H Travel Grant Award

December 2019

Dean's List, *University of Rochester*

Spring 2017