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, js, SQL

PROFESSIONAL EXPERIENCE

Research Data Scientist, *Ultrasound AI group, Philips* July 2020 ~ Present

- Leading deep learning algorithm development for FAST ultrasound exam on mobile ultrasound system: *Lumify*
  - Successfully passed concept selection & validation process for AI solution deployment to Philips ultrasound system (preparing validations study for FDA 510(k) clearance)
  - Developed 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 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
- Processed radiology reports using CheXpert NLP tool for workflow prioritization
- Lead internal ML model research workflow development that is now used by multiple project teams
- Authored 10+ invention disclosures (6 provisional patent filings) on AI for 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-train data 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 for cardiomyocyte cells and contributed publishing research 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 Program)

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.

Undergraduate Research Assistant, *Wismüller Lab, University of Rochester* May 2017 - January 2018

- Tumor segmentation in brain MR images by implementing various classical machine learning and image processing algorithms with MATLAB
- Utilized GLCM texture analysis, Super-pixel clustering, region growing, and Support Vector Machine

PUBLICATIONS

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%]

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 all
Society of Academic Emergency Medicine (SAEM), May 2023 - Accepted for presentation

"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 all
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 all
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