

# Hyeonsoo Lee

RESEARCH SCIENTIST

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“Where others see impossibility, I see opportunity for innovation.”

## Summary

Visionary AI Research Scientist with expertise in medical imaging, particularly breast cancer detection and risk prediction. Proven track record of developing cutting-edge models that surpass state-of-the-art performance. Skilled in full-cycle machine learning projects, from data processing to model deployment, with a focus on improving healthcare outcomes through AI.

## Work Experience

### Lunit Inc.

Seoul, South Korea

RESEARCH SCIENTIST

Mar. 2021 - Present

- Breast Cancer Risk Prediction:
  - Pioneered image-based risk prediction models, achieving 7%+ improvement over state-of-the-art in time-dependent AUC
  - Established standardized survival data format and evaluation metrics through cross-functional collaboration
  - Collaborated with medical directors and hospitals, implementing training and inference pipelines on-site
  - Published research in MICCAI and two leading clinical research journals
- Early Breast Cancer Detection:
  - Optimized 3D Digital Breast Tomosynthesis (DBT) Cancer Detection Model, doubling inference speed
  - Led comprehensive refactoring of core research codebase, unifying 2D and 3D models
  - Implemented unit and integration tests for ML models, preserving performance across repository migrations
  - Contributed to new product release, facilitating FDA approval through robust codebase and documentation
  - Authored papers accepted at ICCV and two prestigious clinical journals
- Chest X-ray Foundation Model:
  - Developed CXR foundation models, surpassing SoTA ELIXR performance by 12% in AUC
  - Spearheaded creation of evaluation framework for 135 abnormal findings and 86 attributes
  - Engineered data processing pipeline using finetuned LLaMA-8b, achieving 80%+ F1 score for 50+ findings
  - Implemented mono-repo structure and docker-compose environment, enhancing collaborative development across 3+ teams
  - Implemented comprehensive tests for LLM modules, enabling shared component centralization across projects
  - Developed critical integration tests for JSON-guided LLM inference, enhancing data processing pipelines

## Research Interests

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|--------------------------|--------------------|--------------------------|-------------------------|
| • Computer Vision        | • Cancer Detection | • Weak Supervision       | • Foundation Models     |
| • Medical Image Analysis | • Risk Prediction  | • Knowledge Distillation | • Large Language Models |

## Publications

### CONFERENCE PROCEEDINGS

- Enhancing breast cancer risk prediction by incorporating prior images  
Hyeonsoo Lee, Junha Kim, Eunkyung Park, Minjeong Kim, Taesoo Kim, Thijs Kooi  
*International Conference on Medical Image Computing and Computer-Assisted Intervention*, 2023
- Bayesian Optimization Meets Self-Distillation  
HyunJae Lee\*, Heon Song\*, Hyeonsoo Lee\*, Gi-hyeon Lee, Suyeong Park, Donggeun Yoo  
*Proceedings of the IEEE/CVF International Conference on Computer Vision*, 2023
- Scribble2label: Scribble-supervised cell segmentation via self-generating pseudo-labels with consistency  
Hyeonsoo Lee, Won-Ki Jeong  
*Medical Image Computing and Computer Assisted Intervention–MICCAI 2020: 23rd International Conference, Lima, Peru, October 4–8, 2020, Proceedings, Part I* 23, 2020

### JOURNAL ARTICLES

- Screening mammography performance according to breast density: a comparison between radiologists versus standalone intelligence detection  
Mi-ri Kwon, Yoosoo Chang, Soo-Youn Ham, Yoosun Cho, Eun Young Kim, Jeonggyu Kang, Eun Kyung Park, Ki Hwan Kim, Minjeong Kim, Tae Soo Kim  
*Breast Cancer Research* 26.1 (2024) p. 68. Springer, 2024

Artificial Intelligence-Powered Imaging Biomarker Based on Mammography for Breast Cancer Risk Prediction  
Eun Kyung Park, Hyeonsoo Lee, Minjeong Kim, Taesoo Kim, Junha Kim, Ki Hwan Kim, Thijs Kooi, Yoosoo Chang, Seungho Ryu  
*Diagnostics* 14.12 (2024) p. 1212. MDPI, 2024

Transformer-based deep neural network for breast cancer classification on digital breast tomosynthesis images  
Weonsuk Lee, Hyeonsoo Lee, Hyunjae Lee, Eun Kyung Park, Hyeonseob Nam, Thijs Kooi  
*Radiology: Artificial Intelligence* 5.3 (2023) e220159. Radiological Society of North America, 2023

Robust artificial intelligence-powered imaging biomarker based on mammography for risk prediction of breast cancer  
Eun Kyung Park, Hyeonsoo Lee, Minjeong Kim, Ki Hwan Kim, Hyeonseob Nam, Yoosoo Chang, Seungho Ryu  
*Journal of Clinical Oncology* 40.16\_suppl (2022) pp. 1543–1543. American Society of Clinical Oncology, 2022

Patents

2024	<b>US11908133B2 (Granted)</b> , Method for cell image segmentation using scribble labels, recording medium and device for performing the method	United States
2024	<b>US20240136068A1 (Application)</b> , Method and device for providing medical prediction by using artificial intelligence model	United States
2024	<b>US20240062526A1 (Application)</b> , Method for training neural network and device thereof	United States

Honors & Awards

DOMESTIC AWARDS

2020	<b>1st Place</b> , Naver AI Rush (Image Classification, Music Genre Classification, Music Mood Tagging)	Seoul, S.Korea
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INTERNATIONAL AWARDS

2020	<b>Top 3%</b> , OpenVaccine: COVID-19 mRNA Vaccine Degradation Prediction	Kaggle
2020	<b>Top 6%</b> , Jigsaw Multilingual Toxic Comment Classification	Kaggle
2019	<b>Top 10%</b> , SIIM-ACR Pneumothorax Segmentation	Kaggle

Education

<b>Ulsan National Institute of Science and Technology (UNIST)</b>	Ulsan, South Korea
M.S. IN COMPUTER SCIENCE AND ENGINEERING	2019 - 2021
<ul style="list-style-type: none"><li>Thesis: Scribble-supervised cell segmentation via self-generating pseudo-labels with consistency</li><li>Developed Scribble2Label, achieving 94% of full-annotation performance using only 30% of skeleton pixels</li><li>Research funded by the Ministry of Science and ICT, Korea (2018-2020)</li></ul>	
<b>Ulsan National Institute of Science and Technology (UNIST)</b>	Ulsan, South Korea
B.S. IN COMPUTER SCIENCE AND ENGINEERING	2014 - 2019

Skills

<b>Programming</b>	Python, C, C++, LaTeX, HTML, Markdown
<b>AI Tools/Libraries</b>	PyTorch, PyTorch-lightning, OpenCV, NumPy, Pandas, Matplotlib
<b>Tools</b>	Linux, Git, Github Actions, Docker
<b>Languages</b>	Korean, English, Japanese