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

- Computer Vision
- Medical Image Analysis
- Cancer Detection
- Risk Prediction
- Weak Supervision
- Knowledge Distillation
- Foundation Models
- 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	**US11908133B2 (Granted)**, Method for cell image segmentation using scribble labels, recording medium and device for performing the method	*United States*
2024	**US20240136068A1 (Application)**, Method and device for providing medical prediction by using artificial intelligence model	*United States*
2024	**US20240062526A1 (Application)**, Method for training neural network and device thereof	*United States*

Honors & Awards

Domestic Awards

2020	**1st Place**, Naver AI Rush (Image Classification, Music Genre Classification, Music Mood Tagging)	*Seoul, S.Korea*

International Awards

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

Education

Ulsan National Institute of Science and Technology (UNIST) *Ulsan, South Korea*
M.S. in Computer Science and Engineering *2019 - 2021*
- Thesis: Scribble-supervised cell segmentation via self-generating pseudo-labels with consistency
- Developed Scribble2Label, achieving 94% of full-annotation performance using only 30% of skeleton pixels
- Research funded by the Ministry of Science and ICT, Korea (2019-2020)

Ulsan National Institute of Science and Technology (UNIST) *Ulsan, South Korea*
B.S. in Computer Science and Engineering *2014 - 2019*

Skills

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