Juhyun (Julie) Lee

Chapel Hill, NC
December 3, 2025

Education

- **University of North Carolina Chapel Hill** — NC, USA
  Ph.D. of Science in Computer Science — *08/2024 - 05/2029*
- **Chung-Ang University** — Seoul, South Korea
  Bachelor of Science in Applied Statistics — *03/2020 - 08/2023*
  - Total GPA of 4.40 / 4.50 (98.86 / 100), Summa Cum Laude
  - Honors: Department Honor Scholarship (2020), Department Secondary Honor Scholarship (2021, 2022), Specialized Academic Scholarship (2022)

Work Experience

- **LG AI Research** — Seoul, South Korea
  Bio Intelligence Lab Research Scientist Intern — *06/2025 – 08/2025*
  - Engineered a multimodal data processing pipeline (MRI, SNPs, and tabular biomarkers) and integrated it into a multi-omics model, boosting Alzheimer's Disease classification accuracy by 20% over SOTA accepted to NeurIPS ImageOmics 2025 [pdf]
  - Architected a modular Plan-Act-Memory AI agent to automate biomedical tasks such as DEG identification and survival analysis on colorectal cancer data using LangChain

Research Experience

- **UNC ViVE Lab** — NC, USA
  Research Assistant (Adviser: Professor Saif Khairat) — *08/2025 – Present*
  - Building a healthcare chatbot utilizing Llama 3 and DeepSeek-R1 with LoRA fine-tuning and vLLM accelerated inference, combined with few-shot prompting to generate context-aware dialogues
  - Developed a speech-to-speech conversational system using gpt-realtime-mini, WebRTC, and TypeScript, achieving seamless bi-directional voice interaction with sub-second latency
- **UNC Yap Lab** — NC, USA
  Research Assistant (Adviser: Professor Pew-Thian Yap) — *01/2025 – 05/2025*
  - Created a framework to analyze structural connectivity gradients in the developing brain, integrating tractography with cortical features and delivered an oral presentation at the ISMRM conference 2025
  - Developed an Implicit Neural Representation framework in PyTorch to map brain spherical coordinates to fMRI-based functional connectivity (Pearson correlation) matrix, enabling efficient data compression and reconstruction of large-scale (10k × 10k) brain networks
- **UNC Data Driven EnviroLab** — NC, USA
  Research Assistant (Adviser: Professor Angel Hsu) — *08/2024 – 12/2024*
  - Implemented ChatNDC, an AI-powered RAG chatbot using LangChain, FAISS, and LLM APIs, processing 500+ policy documents (PDF/CSV) to deliver fast, accurate, and policy-relevant insights on climate action
- **CAU ET Laboratory** — Seoul, South Korea
  Undergraduate Research Assistant (Adviser: Professor Ilyoup Kwak) — *03/2022 – 06/2023*
  - **Gene Expression Value Prediction**: Preprocessed data and contributed building a novel Transformer model with TensorFlow to predict gene expression value using millions of DNA sequence data, achieving **3rd** place among 100+ teams in Dream Challenge 2022
  - **Sound Event Detection**: Participated in DCASE (Detection and Classification of Acoustic Scenes and Events) Task4 Sound Event Detection in 2023 and applied an attention network optimized for extracting frequency information
  - **Medical Data Analysis**: Performed multivariate logistic regression on structured data using Python libraries including SciPy, Pandas, and Matplotlib to identify key factors influencing taste and olfactory abnormalities, as well as discrepancies between patients' subjective perceptions and objective test results
- **CAU Intelligent Multimodal Reasoning Lab** — Seoul, South Korea
  Undergraduate Research Assistant (Adviser: Professor Junyeong Kim) — *01/2023 – 06/2023*
  - Conducted weekly paper reviews on mitigating bias in AI systems and participated in monthly seminars with the KAIST U-AIM laboratory

Conference Presentations

- NeurIPS Imageomics Workshop. Poster presentation. Dec 2025.
- UNC Graduate Research Symposium. Poster presentation. Oct 2025.
- UNC Data Science Day. Poster presentation. Sep 2025.
- International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting. Oral presentation. May 2025.

Teaching

- **UNC PRIMES Summer School** — Chapel Hill, NC
  Instructor — *04/2025 – 06/2025*
  - **Teaching**: Designed and recorded a 5-hour video course on Computer Vision and Medical Image Processing for high school students, crafted hands-on coding exercises, and led weekly office hours sections

Projects

- **Brain Tumor Segmentation** — Chapel Hill, NC
  Engineer — *09/2024 – 11/2024*
  - **Model Building**: Implemented and trained 3D U-Net and 3D Attention U-Net models using Pytorch for brain tumor segmentation, achieving metrics within 5% of state-of-the-art benchmarks [technical report]
  - **Data Engineering**: Preprocessed MRI data and implemented diverse data augmentations, building an efficient end-to-end data pipeline for model training using Pytorch
- **Samsung Software Academy for Youth** — Gwangju, South Korea
  Developer — *07/2023 – 06/2024*
  - **Full-stack Web Development**: Engineered and deployed full-stack web applications using Vue.js, Spring Boot, and MySQL, implementing a microservices architecture to ensure scalability and efficient performance. Leveraged GitLab for version control and optimized project tracking using Agile methodologies in Jira.

Publications

- Lee, Juhyun, et al. Structural MRI–Informed Multimodal Fusion for Robust Alzheimer's Disease Prediction. NeurIPS 2025 Workshop for Imageomics: Discovering Biological Knowledge from Images Using AI.
- Rafi, A.M., Nogina, D., Penzar, D. et al. A community effort to optimize sequence-based deep learning models of gene regulation. Nat Biotechnol (2024). https://doi.org/10.1038/s41587-024-02414-w
- Kwak, IY., Kim, BC., Lee, J. et al. Proformer: a hybrid macaron transformer model predicts expression values from promoter sequences. BMC Bioinformatics 25, 81 (2024). https://doi.org/10.1186/s12859-024-05645-5

Skills

- **Programming languages**: Python, R, Java, SQL, MATLAB, Javascript
- **ML & DATA**: Pytorch, TensorFlow, scikit-learn
- **Frameworks**: SpringBoot, FastAPI, VueJS, SwiftUI, Unity

References

- **Gedas Bertasius** — Email : gedas@cs.unc.edu
  Computer Science Department at UNC Chapel Hill — *Assistant Professor*
- **Kiyoung Kim** — Email : elgee.kim@lgresearch.ai
  LG AI Research — *Senior Research Scientist*
- **Pew-thian Yap** — Email : ptyap@med.unc.edu
  Department of Radiology at UNC Chapel Hill — *Professor*