Jaewook (Jake) Lee

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summary

Ph.D. candidate in Computer Science at UMass Amherst applying generative AI and LLMs to diverse domains, from education technology to security. Skilled in statistical modeling, evaluation design, and human-AI collaboration, with a strong foundation in computer systems and deep learning frameworks from earlier work on compiler optimization and Processing-in-Memory platforms. Published in leading venues (EMNLP, NAACL, AIED, ACM TODAES) with experience in both academic research and industry-scale AI projects.

education

University of Massachusetts, Amherst, MA, United States

- Ph.D. in *Computer Science* (Advisor: Prof. Andrew Lan) 2022.9 - present
  - Research Area: NLP Application, Personalization, Human-in-the-loop AI GPA: 3.89/4.0
  - Passed Qualification Exam with distinction (2025.05)

Korea University, Seoul, Republic of Korea

- M.E. in *Electrical and Computer Engineering* (Advisor: Prof. Seon Wook Kim) 2019.1 - 2022.2
  - Research Area: Compiler, Processing-in-Memory, AI framework GPA: 4.28/4.5
- B.E. in *Electrical Engineering*, Graduated with honors 2013.3 - 2019.8
  GPA: 3.98/4.5

work experience

Amazon Web Service, Seattle, WA, United States 2025.5 - 2025.8
Applied Scientist Intern

- Developed a methodology for evaluating a security review multi-agent framework (details under NDA).

Eedi, London, United Kingdom (Remote) 2023.6 - 2023.8
Machine Learning Research Intern

- Built the prototype for AnSearch, an AI-driven math diagnostic question generator that won the Tools Competition, combining LLM speed with educator expertise to create assessments targeting common misconceptions.

research experience

Ph.D. Research in Generative AI and NLP 2022.9 - present
University of Massachusetts, Amherst

- **AI for Human Creativity and Learning — Keyword Mnemonics**
  - Statistical modeling: Developed expectation–maximization models to learn latent user variables and generation rules for interpretable mnemonics (ARR 2025)
  - Phonological similarity: Mentored and advised research on algorithms that identify phonologically similar keywords in a learner's L1 for L2 vocabulary acquisition (ARR 2025)
  - Evaluation: Designed and deployed evaluation pipelines combining psycholinguistic measures with human assessments to measure mnemonic memorability and creativity (EMNLP 2024)
  - Multi-modal creativity: Initiated early exploration of integrating LLM-generated verbal cues with visual elements, opening a new direction for mnemonic design (AIED 2023)

- **AI for Educational Assessment and Feedback — Math Education**
  - Training LLM-based tutors: Developed a training approach for dialogue-based tutors that optimizes tutor responses for both student correctness and pedagogical quality, using candidate generation, scoring, and preference optimization (AIED 2025)
  - Automated distractor creation: Created pipelines using prompting, fine-tuning, and variational error modeling to produce plausible, targeted distractors (NAACL 2024)
  - Human–AI collaboration: Designed interactive authoring workflows enabling educators to refine AI-generated stems and distractors (EDM 2024)

M.E Research in Computer Systems 2019.1 - 2022.2
Korea University, Seoul

- **AI Systems and Platform Optimization (Industry–Academia collaboration)**
  - PIM platforms: Developed ONNX Runtime integration for PIM on both x86 and ARM environments; designed profiling and scheduling algorithms to optimize DNN inference on heterogeneous PIM architectures (SK Hynix, TODAES 2023).
  - Compiler-based frameworks for NPUs: Built tools to extract memory traces from DNN accelerators and modified LLVM to generate code that maximizes scratchpad memory efficiency (Samsung).

publications (* denotes equal contribution)

Jaewook Lee, Alexander Scarlatos, Andrew Lan, "Interpretable Mnemonic Generation for Kanji Learning via Expectation-Maximization," Proceedings of the Association for Computational Linguistics: EMNLP, Suzhou, China, 2025 📎 (commited, review 3.33, meta-review: 4)

Sana Kang*, Myeongseok Gwon*, Su Young Kwon*, **Jaewook Lee**, Andrew Lan, Bhiksha Raj, Rita Singh, "PhoniTale: Phonologically Grounded Mnemonic Generation for Typologically Distant Language Pairs," Proceedings of the Association for Computational Linguistics: EMNLP, Suzhou, China, 2025 📎 (commited, review: 3.5, meta-reivew: 3.5)

Jaewook Lee, Jeongah Lee, Wanyong Feng, Andrew Lan, "From Text to Visuals: Using LLMs to Generate Math Diagrams with Vector Graphics," International Conference on Artificial Intelligence in Education (AIED), Palermo, Italy, 2025 📎

Alexander Scarlatos, Naiming Liu, **Jaewook Lee**, Richard Baraniuk, Andrew Lan, "Training LLM-based Tutors to Improve Student Learning Outcomes in Dialogues," International Conference on Artificial Intelligence in Education (AIED), Palermo, Italy, 2025 📎

Jaewook Lee, Hunter McNichols, Andrew Lan, "Exploring Automated Keyword Mnemonics Generation with Large Language Models via Overgenerate-and-Rank," Findings of the Association for Computational Linguistics: EMNLP, Florida, USA, 2024 📎

Wanyong Feng*, **Jaewook Lee***, Hunter McNichols*, Alexander Scarlatos*, Digory Smith, Simon Woodhead, Nancy Otero Ornelas, Andrew Lan, "Exploring Automated Distractor Generation for Math Multiple-choice Questions via Large Language Models," Findings of the Association for Computational Linguistics: NAACL, Mexico City, Mexico, 2024 📎

Seok Young Kim*, **Jaewook Lee***, Yoonah Paik, Chang Hyun Kim, Won Jun Lee, Seon Wook Kim, "Optimal Model Partitioning with Low-Overhead Profiling on the PIM-based Platform for Deep Learning Inference," ACM Transactions on Design Automation of Electronic Systems, 29(2), 1-22 📎

Jaewook Lee, Andrew Lan, "SmartPhone: Exploring Keyword Mnemonic with Auto-generated Verbal and Visual Cues," International Conference on Artificial Intelligence in Education (AIED), Tokyo, Japan, 2023 📎

posters

Jaewook Lee, Digory Smith, Simon Woodhead, Andrew Lan, "Math Multiple Choice Question Generation via Human-Large Language Model Collaboration," International Conference on Educational Data Mining (EDM), Atlanta, USA, 2024 📎

Hunter McNichols, **Jaewook Lee**, Stephen Fancsali, Steve Ritter, Andrew Lan, "Can Large Language Models Replicate ITS Feedback on Open-Ended Math Questions?", International Conference on Educational Data Mining (EDM), Atlanta, USA, 2024 📎

Nischal Ashok Kumar, Wanyong Feng, **Jaewook Lee**, William Hunter McNichols, and Andrew Lan, "A Conceptual Model for End-to-End Causal Discovery in Knowledge Tracing," International Conference on Educational Data Mining (EDM), Bengaluru, India, 2023 📎

awards

NAEP Math Automated Scoring Challenge Grand Prize 🏆 2023
Organized by National Center for Education Statistics (NCES)

- Challenge to develop an accurate, LLM-based scoring system for open-ended math responses

NeurIPS 2022 Causal Edu Competition (Task 3) - 3rd 2022
Organized by EEDI

- Challenge to identify causal relationship in real-world educational time-series data

iOS Application Hackathon Grand Prize 🏆 2018
Organized by Software Technology and Enterprise, Korea University

- Developed a vocabulary builder app designed to help users efficiently memorize new words

skill set

Deep Learning	Skilled in PyTorch and ONNX Runtime for model deployment
Debugging & Analysis	Strong skills in debugging and performance optimization
Programming	Expertise in C, C++, and Python
Web Development	Expertise in building interfaces with React for human evaluations
UX/UI	Knowledge in UX research and interface design
Mobile Development	Hands-on experience with iOS and Android app development