Mingi Kang

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EDUCATION

Bachelor of Arts in Computer Science and Minor in Mathematics — Expected May 2026
Bowdoin College, ME
GPA: 3.67/4.00

Study Abroad Semester, Computer Science — August – December 2024
Aquincum Institute of Technology, Budapest, Hungary

RESEARCH INTERESTS

Computer Vision * Computational Imaging * Deep Architectures * Machine Learning * Natural Language Processing

TECHNICAL SKILLS

Programming Languages

- Python, R, SQL, C, Java

Machine Learning & Deep Learning

- PyTorch, TensorFlow, Keras, Scikit-Learn, Numpy, Pandas, SciPy, Matplotlib, OpenCV, ggplot2

Developer Tools & HPC

- **Tools:** Git, GitHub, Bash, Overleaf/LaTeX, Markdown
- **HPC:** Slurm (sbatch), IBM LSF (bsub)

RELEVANT COURSEWORK

Computer Science:

- Artificial Intelligence, Computer Systems, Algorithms, Data Structures, Cryptography, Data Science, Computational Game Theory

Mathematics:

- Linear Algebra, Multivariable Calculus, Probability, Statistics, Mathematical Reasoning, Advanced Topics in Probability and Statistics

PUBLICATIONS, PRESENTATIONS, MEDIA

Publications

1. Yang, Z., **Kang, M.**, Farias, J. (2025). ZiLU activation. *In preparation for submission.*
2. **Kang, M.**, Farias, J. (2025). Attention Via Convolutional Nearest Neighbors. *Under Review for conference submission.* https://arxiv.org/abs/2511.14137.
3. **Kang, M.** (2025). Parallel qMRI Reconstruction from 4x Accelerated Acquisitions. *Technical Report from McKelvey Engineering Summer Research Fellowship 2025.* https://arxiv.org/abs/2511.18232.
4. Kumar, A.A., **Kang, M.**, Kronenberger W.G., Jones M.N., Pisoni D. (2024). Structures and process-level lexical interactions in memory search: A case study of individuals with cochlear implants and normal hearing. *Proceedings of the 46th Annual Meeting of the Cognitive Science Society (Vol. 46)*. DOI: https://escholarship.org/uc/item/7vn9q9hh.

Oral Presentation

1. **Kang M.** (July 2025). Parallel qMRI Reconstruction from 4x Accelerated Acquisitions. *McKelvey School of Engineering Summer Symposium,* St. Louis, Missouri.

Poster Presentations

1. **Kang M.**, Farias J. (October 2025). Convolutional Nearest Neighbors: Reinterpreting Convolution Through K-Nearest Neighbor Selection. *2025 IEEE MIT Undergraduate Research Technology Conference (MIT URTC)*, Cambridge, Massachusetts.
2. **Kang M.** (July 2025). Parallel qMRI Reconstruction from 4x Accelerated Acquisitions. *McKelvey School of Engineering Poster Palooza,* St. Louis, Missouri.
3. **Kang M.**, Kumar A. (July 2024). Structure and process-level lexical interactions in memory search: A case study of individuals with cochlear implants and normal hearing. *Annual Conference of the Cognitive Science Society 2024*, Rotterdam, Netherlands.

Media Coverage

1. Mingi Kang '26: Advancing Computers' Ability to See and Understand Our World. https://www.bowdoin.edu/news/2025/11/mingi-kang-26-advancing-computers-ability-to-see-and-understand-our-world.html. November 20, 2025.

RESEARCH EXPERIENCE

Senior Honors, Bowdoin College, Brunswick, Maine August 2025 – Present
Advisor: Jeova Farias

- Finalizing **ConvNN**, a unified framework bridging convolution and attention through k-nearest neighbor selection, with first-author paper submitted and currently under review.
- Architected hybrid branching layers combining spatial (Conv2d) and feature-based (ConvNN) aggregation, achieving 4-8% accuracy gains on CIFAR-10/100 in VGG architectures.
- Demonstrated effectiveness across CNN and Transformer architectures through systematic ablation studies on neighbor selection strategies.

Computational Imaging Group, Washington University in St. Louis, St. Louis, Missouri May 2025 – August 2025
McKelvey Summer Engineering Fellow
Advisor: Ulugbek S. Kamilov
Graduate Student Mentor: Shirin Shoushtari

- Redesigned deep unfolding U-Net architecture for parallel qMRI reconstruction, achieving **4x parameter reduction** while maintaining reconstruction quality (37 dB PSNR, 0.923 SSIM) on 4x accelerated scans.
- Developed novel normalization techniques (ACS region-specific and coil-instance) for under-sampled k-space preprocessing, validated on patient dataset from WashU Medical School.

Computer Science Department, Bowdoin College, Brunswick, Maine January 2025 – May 2025
Research Assistant
Advisor: Jeova Farias

- Developed **Convolutional Nearest Neighbor Attention (ConvNN-Attention)**, an efficient attention mechanism using hard k-NN selection and convolutional aggregation, reducing computational cost by **18% (GFLOPS)** with accuracy improvement (2.4%) on CIFAR-10/100.
- Implemented modular PyTorch layers compatible with standard Transformer and Vision Transformer architectures, enabling drop-in replacement for self-attention.

Computer Science Department, Bowdoin College, Brunswick, Maine January 2024 – August 2024
Christenfeld Summer Research Fellow
Advisor: Jeova Farias

- Developed **Convolutional Nearest Neighbor (ConvNN)** algorithm integrating norm-based k-NN pixel selection into standard convolution operations for spatial feature learning.
- Built modular PyTorch implementation (1D/2D) with configurable sampling strategies (random, spatial), pixel-shuffling, and positional encoding for systematic comparison.

Lexicon Lab, Bowdoin College, Brunswick, Maine December 2022 – May 2024
Research Assistant
Advisor: Abhilasha Kumar

- Investigated lexical retrieval processes in prelingually deaf cochlear implant users through computational cognitive modeling, contributing to **published CogSci 2024 paper** (second author).
- Extended Python package *Forager* with joint semantic embeddings (word2vec, speech2vec) for quantitative analysis, revealing differential reliance on speech-derived representations.

Ungated Research, Bowdoin College, Brunswick, Maine April 2024 – August 2025
Research Assistant
Advisor: Martin Abel

- Engineered automated data pipeline integrating Google Sheets API, MariaDB, and Amazon S3 for economics research platform, reducing journal upload process time by 85%.

TEACHING & MENTORING EXPERIENCE

Quantitative Tutor, Bowdoin College, Brunswick, Maine August 2025 – Present
Bowdoin College Baldwin Center for Learning and Teaching

- Provide one-on-one tutoring in Computer Science (algorithms, data structures, AI), Mathematics (linear algebra, probability, statistics), and Economics (microeconomics, macroeconomics).
- Support students in debugging code, understanding theoretical concepts, and developing problem-solving strategies for quantitative coursework.

Learning Assistant, Bowdoin College, Brunswick, Maine August 2025 – Present
Courses: Introduction to Statistics

- Conduct weekly learning assistant hours supporting 20+ students with R programming, statistical analysis, hypothesis testing, and data visualization.

- Guide students through applied projects involving real-world datasets, emphasizing statistical thinking and reproducible analysis.

Learning Assistant, Bowdoin College, Brunswick, Maine January 2025 – Present
Courses: Introduction to Computer Science

- Lead weekly learning assistant hours for 40+ students covering Python fundamentals and object-oriented programming.
- Mentor students on debugging techniques, code organization, and software development best practices.

Sophomore Bootcamp Leader, Bowdoin College, Brunswick, Maine January 2025, January 2026
Career Exploration and Development Group

- Designed and delivered workshops on career development for 400+ sophomores, covering resume writing, behavioral interviews, and internship navigation.
- Mentored 5 student teams in inaugural Sophomore Bootcamp Hackathon, providing technical guidance on full-stack development, API integration, and project management.
- Advised students on career pathways in technology and research, including graduate school preparation and industry opportunities.

AWARDS AND HONORS

John L. Roberts Fund Fall Research Award, Bowdoin College ($2,463) October 2025
Best Poster Presentation Award in Summer Poster Competition, Washington University in St. Louis ($100) July 2025
McKelvey Engineering Summer Research Fellowship, Washington University in St. Louis **(**$7,200) May 2025
Allen B. Tucker Computer Science Research Prize, Bowdoin College ($50) May 2025
CRA Undergraduate Award, Last Mile Education ($4,000) April 2025
NYC Stem Award, Last Mile Education ($1,500) March 2025
Google AI 2024 Award, Last Mile Education ($595) January 2025
Christenfeld Summer Research Fellowship, Bowdoin College ($4,800) April 2024
NSF Student Faculty Research Fellowship, Bowdoin College ($1,800) January 2024
National College Match Finalist, QuestBridge September 2021

LANGUAGES

English (Native) * Korean (Native) * German (Conversational)

Websites:
Personal Website - https://mingikang31.github.io/
GitHub - https://github.com/mingikang31
LinkedIn - http://www.linkedin.com/in/mingi-kang-40bb61254