Khang Nguyen

Los Angeles, CA 90025 | khang@math.ucla.edu | 424 535 5030

Research Interests

Mathematical machine learning, neural network optimization, geometric deep learning, applied geometry/topology

Education

University of California, Los Angeles — Los Angeles, CA
Ph.D. Student in Mathematics — 2024 - Present
M.A. in Mathematics — 2025

Vietnam National University Ho Chi Minh City - University of Science — Ho Chi Minh City, Vietnam
B.Sc. in Mathematics (Hons.) | Valedictorian | CGPA: 9.69/10.0 — 2019 - 2023
Thesis: *The Ollivier-Ricci Curvature and its Application in Graph Neural Networks* — Advisor: Dr. Vu Quang Huynh

Publications and Preprints

[1] **Khang Nguyen** and Guido Montúfar. On Parameter Symmetries and Conservation Laws in Gradient Flow, 2026. arXiv:2609.34549 [cs.LG].

[2] Ava Berenji, **Khang Nguyen**, and Guido Montúfar. Critical Points of Linear Self-Attention with Quadratic Loss on a Single Training Example. In *OPT 2026: Optimization for Machine Learning (NeurIPS 2026 Workshop)*, 2026. Accepted.

[3] **Khang Nguyen**, Hieu Nong, Vinh Nguyen, Nhat Ho, Stanley Osher, and Tan Nguyen. Revisiting Over-smoothing and Over-squashing Using Ollivier-Ricci Curvature. In *International Conference on Machine Learning*, 2023.

[4] **Khang Nguyen**, Hieu Nong, Khuong Nguyen, Tan Nguyen, and Vinh Nguyen. DeepGRAND: Deep Graph Neural Diffusion. In *Asilomar Conference on Signals, Systems, and Computers*, 2023.

[5] Le Van Chua, Nguyen Tien Hoang, and **Khang Nguyen**. On the Connectivity of the Proper Enhanced Power Graph of Groups. Unpublished preprint, 2021.

Research Experience

Graduate Student Researcher, UCLA — Los Angeles, CA
Advisor: Prof. Guido Montúfar — 2025 - Present

- Develop a geometric framework to characterize the relationship between symmetries and conservation laws in gradient flow, with applications to grouped-query attention and polynomial neural networks.
- Investigate harness optimization techniques for large language models in mathematical reasoning and discovery.

AI Research Resident, FPT Software — Ho Chi Minh City, Vietnam
Advisors: Asst. Prof. Tan Minh Nguyen and Asst. Prof. Nhat Ho — 2021 - 2024

- Studied curvature and diffusion methods for understanding and mitigating over-smoothing and over-squashing in graph neural networks, resulting in publications at ICML and Asilomar.
- Selected as a top performer (Q2 2023) among 48,000+ FPT employees.

Undergraduate Researcher, University of Science Algebra Group — Ho Chi Minh City, Vietnam
Advisor: Prof. Mai Hoang Bien — 2020 - 2021

- Resolved an open question on connectivity in proper enhanced power graphs of p-groups; co-authored the resulting manuscript in algebraic graph theory.

Conferences and Talks

- *Revisiting Over-smoothing and Over-squashing Using Ollivier-Ricci Curvature*, Vietnam Mathematical Congress, Da Nang, Vietnam, August 2023 (contributed talk)

Academic Service

- Reviewer, Neural Information Processing Systems (NeurIPS), 2026
- Reviewer, Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2026
- Reviewer, International Conference on Learning Representations (ICLR), 2025, 2026
- Reviewer, International Conference on Machine Learning (ICML), 2024

Mentorship and Leadership

Research Mentor — Los Angeles, CA
UCLA Olga Radko Endowed Math Circle — 2025 - 2026

- Mentored high school students to conduct independent research on the optimization landscape of the self-attention mechanism, resulting in a paper at the NeurIPS 2026 workshop on Optimization for Machine Learning (OPT2026)

Head of Academic Content — Ho Chi Minh City, Vietnam
Projects in Mathematics and Applications Summer Camp — 2024

- Led a team of 16 graduate and undergraduate students across time zones to develop the curriculum and oversaw 6 independent academic projects in linear optimization for 24 high school students
- Planned and organized multiple key events for up to 60 participants including lectures, invited speeches, industry visit, and project presentation
- Managed relations with multiple sponsors and raised $4,500 in travel grants and stipend

Mentor of Mathematics — Hanoi, Vietnam
Maths and Science Summer Program — 2019 - 2021

- Designed and delivered lecture series on information theory; supervised 11 students in projects on Shannon's theorems and data compression

Teaching Experience

- Teaching Assistant, MATH 174E: Mathematics of Finance for Mathematics/Economics Students - Summer 2025, 2026
- Teaching Assistant, MATH 164: Optimization - Fall 2026
- Teaching Assistant, MATH 33A: Linear Algebra and Applications - Fall 2024, Winter 2025
- Teaching Assistant, MATH 32B: Calculus of Several Variables - Spring 2025
- Teaching Assistant, COMPTNG 16A: Python with Applications I - Fall 2025, Winter 2026, Spring 2026

Honors and Awards

- Horn-Moez Prize for Excellence in First-Year Graduate Studies, UCLA Department of Mathematics, 2025
- University Valedictorian, Vietnam National University Ho Chi Minh City - University of Science, 2023
- Fellowship for Pre-Graduate Studies in Mathematics, 2022
- SIMIODE Challenge Using Differential Equations Modeling, Outstanding Award, 2021
- Multiple merit-based and competitive undergraduate scholarships and fellowships, 2019-2023
- Vietnam Institute for Advanced Study in Mathematics Student Scholarship, 2020
- Vietnam National Student Olympiad in Mathematics, First Prize, 2019
- Vietnam Mathematical Olympiad, Third Prize, 2019

Technical Skills

- Programming: Python, MATLAB, Maple, R
- Libraries: PyTorch, Hugging Face, PyTorch Geometric, NumPy, pandas, NetworkX, Python Optimal Transport
- Other tools: Git, LaTeX
- Languages: Vietnamese (native), English

Memberships

- Society for Industrial and Applied Mathematics