Kedar Karhadkar

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Education

Ph.D. Applied Mathematics, *University of California, Los Angeles* 08/2021 – 05/2025 | Los Angeles, CA

- Research interests: machine learning, deep learning theory, graph neural networks.
- GPA: 3.93.
- Passed all qualifying exams upon entry.
- Selected coursework: Machine Learning, Optimization, Numerical Linear Algebra, High-dimensional Statistics.

B.S. Mathematics, *Pennsylvania State University* 08/2017 – 05/2021 | University Park, PA

- GPA: 3.93.
- Selected coursework: Data Structures and Algorithms, Probability, Mathematical Statistics, Real/Complex/Functional Analysis (Graduate), Abstract Algebra (Graduate), Algebraic Geometry (Graduate).

Skills

- Software Development: Python, C++, C, Java, HTML, CSS, JavaScript, TypeScript.
- Machine Learning: PyTorch, Tensorflow, Numba, NumPy, SciPy, Matplotlib, Pandas, Scikit-learn, SQL, Julia, MATLAB, Maple.

Experience

Graduate Student Researcher, *UCLA* 08/2021 – present

- Conducted research on graph neural networks, machine learning, and deep learning theory accepted to major conferences (ICLR, Allerton).
- Designed architectures for graph neural networks (GNNs) to prevent bottlenecks, increasing accuracy on graph classification tasks by up to 20% while achieving a 10x speedup over existing state-of-the-art rewiring algorithms. Implemented all methods in PyTorch.
- Served as a reviewer for the three top machine learning conferences (NeurIPS, ICML, ICLR) as well as TMLR and Discrete Applied Mathematics.

Visiting Researcher, 06/2023 – 09/2023

Max Planck Institute for Mathematics in the Sciences

- Conduct research on graph transformers and graph neural networks and present results to other researchers.

Undergraduate Researcher, *University of Minnesota REU* 06/2020 – 08/2020

- Determined and proved necessary conditions for the Yang-Baxter equation to hold in a more general setting than previously known.

Selected Publications

For a complete list, see my Google Scholar profile.

- *Mildly Overparameterized ReLU Networks Have a Favorable Loss Landscape*
  Kedar Karhadkar, Michael Murray, Hanna Tseran, and Guido Montúfar. Submitted. Preprint: arXiv:2305.19510.
- *FoSR: First-order spectral rewiring for addressing oversquashing in GNNs*
  Kedar Karhadkar, Pradeep Kr. Banerjee, and Guido Montúfar. ICLR 2023. Preprint: arXiv:2210.11790.
- *Oversquashing in GNNs through the lens of information contraction and graph expansion*
  Pradeep Kr. Banerjee, **Kedar Karhadkar**, Yu Guang Wang, Uri Alon, and Guido Montúfar. 58th Annual Allerton Conference on Communication, Control and Computing (2022). Preprint: arXiv:2208.03471.
- *Parity of the partition function p(n, k)*
  Kedar Karhadkar. International Journal of Number Theory (2019). Preprint: arXiv:1809.07459.