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: 3.91.
- 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, C#, HTML, CSS, JavaScript, TypeScript, React, Git, Linux, Docker.
- Machine Learning: PyTorch, Tensorflow, Numba, NumPy, SciPy, Matplotlib, Pandas, Scikit-learn, XGBoost, 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

Asterisk (*) indicates equal contribution.
- *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 ⧉ .
- *Two dependent probabilistic chip-collecting games*.
  Joshua Harrington*, **Kedar Karhadkar***, Madeline Kohutka*, Tessa Stevens*, and Tony W.H. Wong*. Discrete Applied Mathematics (2021) ⧉ .
- *Parity of the partition function p(n, k)*.
  Kedar Karhadkar. International Journal of Number Theory (2019). Preprint: arXiv:1809.07459 ⧉ .