Derek Lim

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AI researcher and engineer soon finishing PhD at MIT. Working on **efficient LLMs**, **post-training**, and **evaluations** at Liquid AI for a year. Worked on **theory and practice** of deep learning, especially focusing on **symmetries** in deep learning, at MIT, NVIDIA, and Meta AI.

Education

Massachusetts Institute of Technology (MIT) 8/2021-x
PhD student, Computer Science. GPA: 4.9. Advisor: Stefanie Jegelka.
Research focus: Symmetries in machine learning: neural network functions and weight spaces.

Cornell University 8/2017-5/2021
BA, Mathematics and Computer Science double major. GPA: 3.99. Magna Cum Laude.

Industry Experience

Liquid AI, Machine Learning Scientist and Engineer 1/2024-x

- Mostly working on the post-training team, for efficient LLMs.
- Experience with many parts of LLM pipeline, from pretraining to evaluation.

NVIDIA, Research Intern 5/2023-12/2023

- Machine learning research with Toronto lab, published ICLR paper on processing NN weights.

Meta AI, Research Intern 5/2022-9/2022

- Machine learning research in Boston and NYC in graph and geometric deep learning.

Honors and Awards

Best paper award, HiLD workshop (High-dimensional Learning Dynamics), ICML 2024
NSF Graduate Fellowship (GRFP) 2022
Honorable Mention, Computing Research Association Outstanding Undergrad Researcher. 2020
First-place winner, Cornell Mathematical Competition in Modelling (team of 3) 2019
Meritorious Winner (top 7%), Mathematical Competition in Modelling (team of 3) 2019

Publications (Google Scholar, 1200+ citations, h-index: 14)

* Denotes equal contribution or alphabetical ordering.

(16) **The Empirical Impact of Neural Parameter Symmetries, or Lack Thereof .**
Derek Lim*, Theo Moe Putterman*, Robin Walters, Haggai Maron, Stefanie Jegelka
Advances in Neural Information Processing Systems (NeurIPS), 2024.
Best paper award, HiLD workshop, ICML

(15) **Graph Metanetworks for Processing Diverse Neural Architectures.**
Derek Lim, Haggai Maron, Marc Law, Jonathan Lorraine, James Lucas.
International Conference on Learning Representations (ICLR), 2024.
Spotlight Paper

(14) **Structuring Representation Geometry with Rotationally Equivariant Contrastive Learning.**
Sharut Gupta*, Joshua Robinson*, **Derek Lim**, Soledad Villar, Stefanie Jegelka.
International Conference on Learning Representations (ICLR), 2024.

(13) **Expressive Sign Equivariant Networks for Spectral Geometric Learning**
Derek Lim, Joshua Robinson, Stefanie Jegelka, Haggai Maron
Advances in Neural Information Processing Systems (NeurIPS), 2023.
Spotlight Papaer

(12) **Equivariant Polynomials for Graph Neural Networks**
Omri Puny*, **Derek Lim***, Bobak Kiani*, Haggai Maron, Yaron Lipman
International Conference on Machine Learning (ICML), 2023.
Oral Presentation

(11) **Graph Inductive Biases in Transformers without Message Passing**
Liheng Ma*, Chen Lin*, **Derek Lim**, Adriana Romero-Soriano, Puneet K. Dokania, Mark Coates, Philip Torr, Ser-Nam Lim
International Conference on Machine Learning (ICML), 2023.

(10) **Sign and Basis Invariant Networks for Spectral Graph Representation Learning**
Derek Lim*, Joshua Robinson*, Lingxiao Zhao, Tess Smidt, Suvrit Sra, Haggai Maron, Stefanie Jegelka.
International Conference on Learning Representations (ICLR), 2023.
Spotlight Paper

(9) **Counting Substructures with Higher-Order Graph Neural Networks: Possibility and Impossibility Results**
Behrooz Tahmasebi, **Derek Lim**, Stefanie Jegelka.
Artificial Intelligence and Statistics (AISTATS), 2023.
Oral Presentation (32/1689 submissions)

(8) **Understanding Doubly Stochastic Clustering.**
Tianjiao Ding, **Derek Lim**, René Vidal, Benjamin Haeffele.
International Conference on Machine Learning (ICML), 2022.

(7) **Equivariant Subgraph Aggregration Networks.**
Beatrice Bevilacqua*, Fabrizio Frasca*, **Derek Lim***, Balasubramaniam Srinivasan, Chen Cai, Gopinath Balamurugan, Michael M. Bronstein, Haggai Maron.
International Conference on Learning Representations (ICLR), 2022.
Spotlight Paper (176 / 3391 submissions)

(6) **Large Scale Learning on Non-Homophilous Graphs: New Benchmarks and Strong Simple Methods.**
Derek Lim*, Felix M. Hohne*, Xiuyu Li*, Linda Huang, Vaishnavi Gupta, Omkar P. Bhalerao,

Ser-Nam Lim.
Advances in Neural Information Processing Systems (NeurIPS), 2021.

(5) **Equivariant Manifold Flows.**
Isay Katsman*, Aaron Lou*, **Derek Lim***, Qingxuan Jiang*, Ser-Nam Lim, Christopher De Sa.
Advances in Neural Information Processing Systems (NeurIPS), 2021.

(4) **Neural manifold ordinary differential equations.**
Aaron Lou*, **Derek Lim***, Isay Katsman*, Leo Huang*, Qingxuan Jiang, Ser-Nam Lim, Christopher De Sa.
Advances in Neural Information Processing Systems (*NeurIPS*), 2020.

(3) **Expertise and dynamics within crowdsourced musical knowledge curation: A case study of the genius platform.**
Derek Lim, Austin R. Benson.
International AAAI Conference on Web and Social Media (*ICWSM*), 2021.

(2) **Spectra of convex hulls of matrix groups.**
Eric Jankowski*, Charles R. Johnson*, **Derek Lim***.
Linear Algebra and its Applications, 2020.

(1) **The doubly stochastic single eigenvalue problem: A computational approach.**
Amit Harlev*, Charles R. Johnson*, **Derek Lim***.
Experimental Mathematics, 2020.

Workshop Papers

(w3) **Sign and Basis Invariant Networks for Spectral Graph Representation Learning**
Derek Lim*, Joshua Robinson*, Lingxiao Zhao, Tess Smidt, Suvrit Sra, Haggai Maron, Stefanie Jegelka.
ICML Workshop on Topology, Algebra, and Geometry in Machine Learning (TAG-ML), 2022.
Spotlight Presentation (4/41 submissions)

(w2) **Counting Substructures with Higher-Order Graph Neural Networks: Possibility and Impossibility Results**
Behrooz Tahmasebi, **Derek Lim**, Stefanie Jegelka.
ICML Workshop on Topology, Algebra, and Geometry in Machine Learning (TAG-ML), 2022.

(w1) **New Benchmarks for Learning on Non-Homophilous Graphs.**
Derek Lim*, Xiuyu Li*, Felix Hohne*, Ser-Nam Lim.
WWW Workshop on Graph Learning Benchmarks (GLB), 2021.

Preprints / Submissions

(p2) **Learning on LoRAs: GL-Equivariant Processing of Low-Rank Weight Spaces for Large Finetuned Models.**
Theo Moe Putterman*, **Derek Lim***, Yoav Gelberg, Stefanie Jegelka, Haggai Maron
arXiv:2410.04207, 2024.

(p1) **Doubly Stochastic Subspace Clustering.**
Derek Lim, René Vidal, Benjamin Haeffele.
arXiv:2011.14859, 2020.

Outreach / Organizing

Weight Space Learning Workshop, ICLR, Organizer	2025
Learning on Graphs NYC Meetup, Organizer	2024
Boston Symmetry Day, Founder Member + Organizer	2023-x
Learning on Graphs Conference (LoG), Founding Member + Organizer	2022
The Gradient, Editor	2022-2023
MIT Graduate Application Assistance Program (GAAP), Mentor	2021-2022
Cornell SoNIC Workshop for underrepresented minorities in CS, Instructor	2021

Teaching

Instructor, MIT Splash!, Cornell Splash! and Rainstorm	2019-2022
Instructor, Inspirit AI	2021
Instructor, SoNIC Summer Research Workshop, Cornell University	2021
CS Teaching Assistant, Cornell University	2018-2021

Reviewing

Conferences

Artificial Intelligence and Statistics (AISTATS)	2024-x
Learning on Graphs Conference (LoG)	2023-x
International Conference on Learning Representations (ICLR)	2023-x
Neural Information Processing Systems (NeurIPS)	2022-x
International Conference on Machine Learning (ICML)	2022-x

Workshops

AI for Science, ICML 2024 (AI4Science)	2024
Symmetry and Geometry in Neural Representations, NeurIPS 2023-2024 (NeurReps)	2023-2024
Topology, Algebra and Geometry-Pattern Recognition, CVPR 2023 (TAG-PRA)	2023
New Frontiers in Graph Learning Workshops, NeurIPS 2022-2023 (GLFrontiers)	2022-2023
Temporal Graph Learning Workshop, NeurIPS 2022-2023 (TGL)	2022-2023
Geometric Deep Learning in Medical Image Analysis Workshop (GeoMedIA)	2022
Workshop on Graph Learning Benchmarks (GLB), WWW	2022
GroundedML Workshop, ICLR	2022

Miscellaneous

Software: Python (PyTorch), Julia, MATLAB, R, Linux, Git, Bash, LaTeX
Skills: Deep learning, optimization, graph neural networks, equivariant neural networks

Invited Talks

1. LMU Munich, Chair for Mathematical Foundations of AI, on Parameter Symmetries 2024
2. Pacific Northwest Seminar TAG-DS, on Graph Metanetworks 2024
3. MIT MLTea, on Equivariant Polynomials for GNNs 2023
4. Macro-Eyes ML Seminar, on Graph Positional Encodings 2022
5. Huawei AI4Sec Research Seminar Series, on GNNs 2022
6. Ecole Polytechnique, Laboratoire d'informatique, on SignNet and BasisNet 2022
7. Stanford University, Graph Machine Learning Reading Group, on SignNet and BasisNet 2022
8. TU Wien, Machine Learning Research Unit Seminar, on SignNet and BasisNet 2022
9. Twitter, on Equivariant Subgraph Aggregation Networks 2022