

Curriculum Vitae/Resume

Ekdeep Singh Lubana
Email: eslubana@umich.edu

EDUCATION

Ph.D. Candidate, University of Michigan, Ann Arbor

August, 2019–ongoing

Co-affiliated with Center for Brain Science, Harvard University

Advisors: Robert P. Dick and Hidenori Tanaka

B.Tech., Indian Institute of Technology, Roorkee

July, 2015–May, 2019

Major: Electronics and Communication Engineering

Thesis: Resource Efficient Techniques for Embedded Machine Vision (Nominated for Best Bachelor's Thesis)

AREAS OF INTEREST

· Interpretability, Alignment, Science of Deep Learning

EXPERIENCE

· **Research Intern**, Qualcomm AI Research, Amsterdam

June., 2023–Nov., 2023

Mentors: Taco Cohen, Johann Brehmer, and Pim de Haan

· **Research Affiliate**, Center for Brain Science, Harvard University

May, 2022–Present

Host: Venkatesh Murthy and Hidenori Tanaka

· **Research Intern**, Bell Labs Cambridge, UK

Sept., 2021–Dec., 2021

Mentor: Akhil Mathur

· **Research Intern**, Physics and Informatics Lab, NTT Research Inc.

May, 2021–Aug., 2021

Mentor: Hidenori Tanaka

PUBLICATIONS

1. **Ekdeep Singh Lubana**, Johann Brehmer, Pim de Haan, and Taco Cohen. FoMo Rewards: Can we cast foundation models as reward functions? In *NeurIPS Foundation Models for Decision Making Workshop*, 2023
2. Samyak Jain*, Robert Kirk*, **Ekdeep Singh Lubana***, Robert P. Dick, Hidenori Tanaka, Edward Grefenstette, Tim Rocktaschel, and David Krueger. Mechanistically Analyzing the Effects of Fine-Tuning on Procedurally Defined Tasks. *arXiv preprint arXiv:2311.12786*, 2023. (In submission.)
3. Eric Bigelow, **Ekdeep Singh Lubana**, Robert P. Dick, Hidenori Tanaka, and Tomer Ullman. In-Context Learning Dynamics with Random Binary Sequences. *arXiv preprint arXiv:2310.17639*, 2023. (In submission.)
4. Maya Okawa*, **Ekdeep Singh Lubana***, Robert P. Dick, and Hidenori Tanaka*. Compositional Abilities Emerge Multiplicatively: Exploring Diffusion Models on a Synthetic Task. In *Proc. Adv. in Neural Information Processing Systems (NeurIPS)*, 2023.
5. **Ekdeep Singh Lubana**, Eric J Bigelow, Robert P. Dick, David Krueger, and Hidenori Tanaka. Mechanistic Mode Connectivity. In *Proc. Int. Conf. on Machine Learning (ICML)*, 2023.
6. Liu Ziyin, **Ekdeep Singh Lubana**, Masahito Ueda, and Hidenori Tanaka. What Shapes the Loss Landscape of Self-Supervised Learning? In *Proc. Int. Conf. on Learning Representations (ICLR)*, 2023.
7. Puja Trivedi and **Ekdeep Singh Lubana**, Mark Heimann, Danai Koutra, and Jay Jayaraman Thiagarajan. Analyzing Data-Centric Properties for Contrastive Learning on Graphs. In *Proc. Adv. in Neural Information Processing Systems (NeurIPS)*, 2022.
8. **Ekdeep Singh Lubana**, Ian Tang, Fahim Kawsar, Robert P. Dick, and Akhil Mathur. Orchestra: Unsupervised Federated Learning via Globally Consistent Clustering. In *Proc. Int. Conf. on Machine Learning (ICML)*, 2022. (Accepted for **Spotlight** presentation.)
9. **Ekdeep Singh Lubana**, Robert P. Dick, and Hidenori Tanaka. Beyond BatchNorm: Towards a Unified Understanding of Normalization in Deep Learning. In *Proc. Adv. in Neural Information Processing Systems (NeurIPS)*, 2021.
10. **Ekdeep Singh Lubana** and Robert P. Dick. A Gradient Flow Framework for Analyzing Network Pruning. In *Proc. Int. Conf. on Learning Representations (ICLR)*, 2021. (Accepted for **Spotlight** presentation.)
11. **Ekdeep Singh Lubana**, Puja Trivedi, Danai Koutra, and Robert P. Dick. How do Quadratic Regularizers Prevent Catastrophic Forgetting: The Role of Interpolation. In *Proc. Conf. on Lifelong Learning Agents (CoLLAs)*, 2022.

12. **Ekdeep Singh Lubana**, Robert P. Dick, Vinayak Aggarwal, and Pyari Mohan Pradhan. Minimalistic Image Signal Processing for Deep Learning Accelerators. In *Proc. Int. Conf. on Image Processing (ICIP)*, 2019.
13. **Ekdeep Singh Lubana**, Vinayak Aggarwal, and Robert P. Dick. Machine Foveation: An Application-Aware Compressive Sensing Framework. In *Proc. Data compression Conference (DCC)*, 2019.
14. **Ekdeep Singh Lubana** and Robert P. Dick. Digital Foveation: An Energy-Aware Machine Vision Framework. *IEEE Trans. Computer-Aided Design of Integrated Circuits and Systems*, pages 2371–2380, 2018.

TECHNICAL SERVICE

- Reviewer for NeurIPS, ICML, ICLR, AISTATS, IEEE TPAMI, IEEE TNNLS 2021–present
- **Top Reviewer**, NeurIPS. 2023
- **Top Reviewer**, ICLR. 2022
- **Top Reviewer**, NeurIPS. 2022

TECHNICAL AWARDS

- Awarded the **BIRAC-GYTI award** by the **President of India**. 2018
- Winner of the **Ericsson Innovation Challenge** held at the Nobel Museum, Stockholm, Sweden. 2017
- Winner of the **Jury’s choice award** at the **Accenture Innovation Challenge**. 2017
- **Gold medal** and **winner of Engineers’ Conclave** at **Inter-IIT Tech meet**. 2018

ACADEMIC ACHIEVEMENTS & SCHOLARSHIPS

- Awarded the **KVPY (Kishore Vaigyanik Protsahan Yojna)** Fellowship by Govt. of India. 2015
- Awarded the **NTSE (National Talent Search)** Scholarship by N.C.E.R.T., New Delhi. 2014
- Ranked amongst **Top 300** students in **National Standard Examination in Astronomy**. 2015
- Ranked amongst **Top 300** Students in the **Indian National Mathematics Olympiad**. 2015