Bhavya Vasudeva

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Education

University of Southern California 2021 - Present
Ph.D. in Computer Science
Advisor: Prof. Vatsal Sharan
Research Interests: Theoretical ML, Optimization, Science of Language Models

Indian Institute of Technology Roorkee 2016 - 2020
B. Tech. in Electronics and Communication Engineering (GPA: 9.362/10, Rank: 3/84)
Thesis: Compressive Sensing MRI Reconstruction using GANs
Advisors: Prof. Saumik Bhattacharya & Prof. P. M. Pradhan

Experience

UC Berkeley | Visiting Graduate Student, Simons Institute Fall 2024
Program on Modern Paradigms in Generalization

NTT Research at Harvard University | Research Intern, PHI Lab and CBS May'24 - Aug'24
Mentor: Dr. Hidenori Tanaka

ISI Kolkata | Visiting Researcher, CVPR Unit June'20 - June'21
Mentors: Prof. Saumik Bhattacharya & Prof. Umapada Pal

Northwestern University | Undergraduate Intern, SN Bose Scholar May'19 - July'19
Mentor: Prof. Yuan Yang

Publications and Preprints

(* denotes equal contribution)

Optimization and Theoretical ML

How Muon's Spectral Design Benefits Generalization: A Study on Imbalanced Data — Submitted
B. Vasudeva, P. Deora, Y. Zhao, V. Sharan, C. Thrampoulidis — HiLD Workshop at ICML'25

The Rich and the Simple: On the Implicit Bias of Adam and SGD — NeurIPS 2025
B. Vasudeva, J. W. Lee, V. Sharan, M. Soltanolkotabi — M3L Workshop at NeurIPS'24

Implicit Bias and Fast Convergence Rates for Self-attention — TMLR 2025
B. Vasudeva*, P. Deora*, C. Thrampoulidis — BGPT Workshop at ICLR'24

Science of Language Models

Latent Concept Disentanglement in Transformer-based Language Models — Submitted
G. Hong*, **B. Vasudeva***, V. Sharan, C. Rashtchian, P. Raghavan, R. Panigrahy — HiLD Workshop at ICML'25

In-Context Occam's Razor: How Transformers Prefer Simpler Hypotheses on the Fly — COLM 2025
P. Deora, **B. Vasudeva**, T. Behnia, C. Thrampoulidis — MOSS Workshop at ICML'25 (**Oral**)

Transformers Learn Low Sensitivity Functions: Investigations and Implications — ICLR 2025
B. Vasudeva*, D. Fu*, T. Zhou, E. Kau, Y. Huang, V. Sharan — BGPT Workshop at ICLR'24

Other Work

Mitigating Simplicity Bias in Deep Learning for Improved OOD Generalization and Robustness — TMLR 2024
B. Vasudeva, K. Shahabi, V. Sharan — SCIS Workshop at ICML'23

Fast Test Error Rates for Gradient Methods on Separable Data — ICASSP 2024
P. Deora*, **B. Vasudeva***, V. Sharan, C. Thrampoulidis — HiLD Workshop at ICML'23

Compressed Sensing MRI Reconstruction with Co-VeGAN: Complex-Valued Generative Adversarial Network
B. Vasudeva*, P. Deora*, S. Bhattacharya, P. M. Pradhan WACV 2022

LoOp: Looking for Optimal Hard Negative Embeddings for Deep Metric Learning ICCV 2021
B. Vasudeva*, P. Deora*, S. Bhattacharya, U. Pal, S. Chanda

Structure Preserving Compressive Sensing MRI Reconstruction using Generative Adversarial Networks
P. Deora*, **B. Vasudeva***, S. Bhattacharya, P. M. Pradhan CVPR Workshops 2020

Multi-Phase Locking Value: A Generalized Method for Determining Instantaneous Multi-frequency Phase Coupling Elsevier Biomedical Signal Processing and Control
B. Vasudeva, R. Tian, D. H. Wu, S. A. James, H. H. Refai, L. Ding, F. He, Y. Yang

Efficient Implementation of LMS Adaptive Filter based FECG Extraction on an FPGA
B. Vasudeva, P. Deora, P. M. Pradhan, S. Dasgupta IET Healthcare Technology Letters

Service

- **Top Reviewer**: NeurIPS 2025
- **Notable Reviewer**: ICLR 2025
- **Top Reviewer**: NeurIPS 2023
- **Reviewer (Conferences)**: NeurIPS (2023-2025), ICLR (2024-2026), ICML (2024-2025), COLM (2025), AISTATS (2025)
- **Reviewer (Workshops)**: ICML'25 (MOSS, HiLD), ICLR'25 (XAI4Science), NeurIPS'24 (M3L), ICML'24 (TF2M, HiLD), ICML'23 (SCIS)
- **Volunteer**: ICML 2021, ICLR 2021

Talks

- **The Rich and the Simple: On the Implicit Bias of Adam and SGD**
  ICTP 6th Youth in High-Dimensions Workshop July 2025
- **Transformers Learn Low-Sensitivity Functions: Investigations and Implications**
  Seminars on Formal Languages and Neural Networks (FLaNN) June 2025
  EnCORE Workshop on Theoretical Perspectives on LLMs at UCSD March 2025

Awards and Academic Achievements

- **Financial Assistance** for attending ICLR'25 2025
- USC **WiSE travel grant** for attending ICML'23, NeurIPS'24, COLM'25 2023-2025
- Selected for **EEML** and **CMMRS** Summer Schools 2021
- **Singhal's Tech. for Society Award** for best undergraduate thesis at institute level, IIT Roorkee 2020
- **Viney K. and Sunita Jain Award** for academic excellence, IIT Roorkee 2020
- **3AI Pinnacle Student of the Year Award** for undergraduate thesis 2020
- **S. N. Bose Scholars Program**, among 50 students selected across India for an internship in the US 2019
- Third position, **International Robotics Challenge** at Techfest'17, IIT Bombay 2017
- Secured IIT JEE Advanced **All India Rank 978**, 99.5 percentile 2016
- Secured IIT JEE Mains **All India Rank 336** among 1.2 million candidates 2016
- Awarded **Kishore Vaigyanik Protsahan Yojana** (KVPY) science fellowship by IISc Bangalore 2015
- Awarded **National Talent Search Examination** (NTSE) scholarship by the Government of India 2014

Teaching and Mentoring Experience

· **Teaching**

- Teaching Assistant for CSCI699: Theory of Machine Learning in Fall'23 at USC
- Teaching Assistant for CSCI567: Machine Learning in Fall'22 at USC

· **Mentoring**

- Jung Whan Lee (USC CS MS'24): led to a NeurIPS 2025 publication
- Youqi Huang (USC CS BS-MS'26, SURE'23 summer research program and CURVE'23-24 research fellowship) and Elliott Kau (USC CS BS-MS'24): led to an ICLR 2025 publication
- Kameron Shahabi (USC CS BS-MS'24, Joined UW CS PhD in Fall'25): led to a TMLR publication
- Devin Martin (USC CS BS/BBA'24): SURE'22 summer research program
- Luke Pratt (K-12 STEM outreach): SHINE'22 summer research program for high school students