

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

SELECTED PUBLICATIONS AND PREPRINTS

(* DENOTES EQUAL CONTRIBUTION)

Theoretical ML and Optimization

1. In-Context Benign Overfitting: A Feature-Selection Model in In-Context Linear Regression

P. Deora, B. Vasudeva, C. Thrampoulidis

In Submission

2. How Muon's Spectral Design Benefits Generalization: A Study on Imbalanced Data

B. Vasudeva, P. Deora, Y. Zhao, V. Sharan, C. Thrampoulidis

ICLR 2026

3. The Rich and the Simple: On the Implicit Bias of Adam and SGD

B. Vasudeva, J. W. Lee, V. Sharan, M. Soltanolkotabi

NeurIPS 2025

4. Implicit Bias and Fast Convergence Rates for Self-attention

B. Vasudeva*, P. Deora*, C. Thrampoulidis

TMLR 2025

Science of Language Models

5. Understanding Contextual Recall in Transformers: How Finetuning Enables In-Context Reasoning over Pretraining Knowledge

B. Vasudeva, P. Deora, A. Biotti, V. Sharan, C. Thrampoulidis

In Submission

6. Latent Concept Disentanglement in Transformer-based Language Models

G. Hong*, B. Vasudeva*, V. Sharan, C. Rashtchian, P. Raghavan, R. Panigrahy

ICLR 2026

7. In-Context Occam's Razor: How Transformers Prefer Simpler Hypotheses on the Fly

P. Deora, B. Vasudeva, T. Behnia, C. Thrampoulidis

COLM 2025 (Oral at MOSS Workshop, ICML'25)

8. Transformers Learn Low Sensitivity Functions: Investigations and Implications

B. Vasudeva* , D. Fu*, T. Zhou, E. Kau, Y. Huang, V. Sharan

ICLR 2025

Other Work

9. Mitigating Simplicity Bias in Deep Learning for Improved OOD Generalization & Robustness

B. Vasudeva, K. Shahabi, V. Sharan

TMLR 2024

10. Fast Test Error Rates for Gradient Methods on Separable Data

P. Deora*, B. Vasudeva*, V. Sharan, C. Thrampoulidis

ICASSP 2024

11. Compressed Sensing MRI Reconstruction with Co-VeGAN: Complex-Valued Generative Adversarial Network

B. Vasudeva*, P. Deora*, S. Bhattacharya, P. M. Pradhan

WACV 2022

12. LoOp: Looking for Optimal Hard Negative Embeddings for Deep Metric Learning

B. Vasudeva*, P. Deora*, S. Bhattacharya, U. Pal, S. Chanda

ICCV 2021

13. Structure Preserving Compressive Sensing MRI Reconstruction using GANs

P. Deora*, B. Vasudeva*, S. Bhattacharya, P. M. Pradhan

CVPR Workshops 2020

SERVICE

- **Top Reviewer:** NeurIPS 2025
- **Notable Reviewer:** ICLR 2025
- **Top Reviewer:** NeurIPS 2023
- **Reviewer (Conferences/Journals):** TMLR, NeurIPS (2023-2025), ICLR (2024-2026), ICML (2024-2026), 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

AWARDS AND ACADEMIC ACHIEVEMENTS

- **CPAL Rising Stars Award** 2026
- Selected for **KAUST Rising Stars in AI** Symposium (Declined) 2026
- **Financial Assistance** award 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

SELECTED TALKS

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

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 publication [3] (NeurIPS'25)
 - Youqi Huang (USC CS BS-MS'26): led to publication [8] (ICLR'25)
 - SURE'23 summer research program and CURVE'23-24 research fellowship
 - Elliott Kau (USC CS BS-MS'24): led to publication [8] (ICLR'25)
 - Kameron Shahabi (USC CS BS-MS'24): led to publication [9] (TMLR'24)
 - Joined UW CS PhD in Fall'25
 - 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