Bhavya Vasudeva

Email: bvasudev@usc.edu, Website: estija.github.io

$\mathbf{Q}$ | 🎓 | in | 🐦

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. Bietti, 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, <u>B. Vasudeva</u>, T. Behnia, C. Thrampoulidis
   COLM 2025   (**Oral** at MOSS Workshop, ICML'25)

8. **Transformers Learn Low Sensitivity Functions: Investigations and Implications**
   <u>B. Vasudeva</u>*, 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 and Robustness**
   <u>B. Vasudeva</u>, K. Shahabi, V. Sharan
   TMLR 2024

10. **Fast Test Error Rates for Gradient Methods on Separable Data**
    P. Deora*, <u>B. Vasudeva</u>*, V. Sharan, C. Thrampoulidis
    ICASSP 2024

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

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

13. **Structure Preserving Compressive Sensing MRI Reconstruction using GANs**
    P. Deora*, <u>B. Vasudeva</u>*, 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

- Selected for **KAUST Rising Stars in AI Symposium** 2026 (declined) — 2026
- **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

SELECTED 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

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)
      · 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