Bhavya Vasudeva

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

Education

University of Southern California 2021-Present
Ph.D. in Computer Science
Advisor: Prof. Vatsal Sharan

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

Research Interests

Theoretical Machine Learning, Science of Deep Learning, ML for Healthcare

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

Can Transformers Learn Tasks of Varying Complexity In-context?
P. Deora, **B. Vasudeva***, T. Behnia*, C. Thrampoulidis *SCSL Workshop@ICLR 2025; In Preparation*

The Rich and the Simple: On the Implicit Bias of Adam and SGD
B. Vasudeva, J. W. Lee, V. Sharan, M. Soltanolkotabi *Submitted*

Implicit Bias of Adam versus Gradient Descent in One-Hidden-Layer Neural Networks
B. Vasudeva, V. Sharan, M. Soltanolkotabi *M3L Workshop@NeurIPS 2024*

Implicit Bias and Fast Convergence Rates for Self-attention
B. Vasudeva*, P. Deora*, C. Thrampoulidis *BGPT Workshop@ICLR 2024; Submitted*

Transformers Learn Low Sensitivity Functions: Investigations and Implications
B. Vasudeva*, D. Fu*, T. Zhou, E. Kau, Y. Huang, V. Sharan *ICLR 2025*
Also as *Simplicity Bias of Transformers to Learn Low Sensitivity Functions* in *BGPT Workshop@ICLR 2024*

Mitigating Simplicity Bias in Deep Learning for Improved OOD Generalization and Robustness
B. Vasudeva, K. Shahabi, V. Sharan *SCIS Workshop@ICML 2023; TMLR 2024*

Fast Test Error Rates for Gradient Methods on Separable Data
P. Deora*, **B. Vasudeva***, V. Sharan, C. Thrampoulidis *HiLD Workshop@ICML 2023; ICASSP 2024*

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
B. Vasudeva*, P. Deora*, S. Bhattacharya, U. Pal, S. Chanda *ICCV 2021*

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

(*equal contribution)

Awards and Academic Achievements

- USC **WiSE travel grant** for attending ICML'23 and NeurIPS'24 *2023, 2024*
- Selected for **EEML** and **CMMRS** Summer Schools *2021*
- **Singhal's Tech. for Society Award** for best undergraduate thesis at institute level *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**
  - TA for CSCI699: Theory of Machine Learning in Fall'23 at USC
  - TA for CSCI567: Machine Learning in Fall'22 at USC
- **Mentoring**
  - Jung Whan Lee (USC MS CS)
  - Youqi Huang, SURE'23 and CURVE'23-24 research programs (USC BS CS) [Poster, Poster]
  - Elliott Kau (USC BS-MS CS)
  - Kameron Shahabi (USC BS-MS CS → UW PhD CS)
  - Luke Pratt, SHINE'22 summer research program (K-12 STEM outreach) [Poster]
  - Devin Martin, SURE'22 summer research program (USC BS CS) [Poster]

Talks

- Transformers Learn Low-Sensitivity Functions: Investigations and Implications March 2025
  EnCORE Workshop on Theoretical Perspectives on LLMs at UCSD
- Implicit Bias and Fast Convergence Rates for Self-Attention Spring 2024
  USC PALMs Group Meeting

Service

- **Top Reviewer**: NeurIPS'23
- **Reviewer (Conferences)**: NeurIPS (2023-25), ICML (2024-25), ICLR (2024-25), AISTATS'25, COLM'25
- **PC Member (Workshops)**: XAI4Science@ICLR'25, M3L@NeurIPS'24, TF2M@ICML'24, HiLD@ICML'24, SCIS@ICML'23
- **Volunteer**: ICML'21, ICLR'21