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

Deep Learning Theory, Science of Language Models

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

On Generalization of Spectral Gradient Descent: A Case Study on Imbalanced Data
B. Vasudeva*, P. Deora*, C. Thrampoulidis *HiLD Workshop@ICML'25*

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

In-Context Occam's Razor: How Transformers Prefer Simpler Hypotheses on the Fly *Submitted*
P. Deora, **B. Vasudeva**, T. Behnia, C. Thrampoulidis *MOSS Workshop@ICML'25*
Also as *Can Transformers Learn Tasks of Varying Complexity In-context?* in *SCSL Workshop@ICLR'25.*

The Rich and the Simple: On the Implicit Bias of Adam and SGD *Submitted*
B. Vasudeva, J. W. Lee, V. Sharan, M. Soltanolkotabi
Also as *Implicit Bias of Adam vs Gradient Descent in One-Hidden-Layer NNs* in *M3L Workshop@NeurIPS'24.*

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

Transformers Learn Low Sensitivity Functions: Investigations and Implications *ICLR 2025*
B. Vasudeva*, D. Fu*, T. Zhou, E. Kau, Y. Huang, V. Sharan
Also as *Simplicity Bias of Transformers to Learn Low Sensitivity Functions* in *BGPT Workshop@ICLR'24.*

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

Fast Test Error Rates for Gradient Methods on Separable Data *ICASSP 2025*
P. Deora*, **B. Vasudeva***, V. Sharan, C. Thrampoulidis *HiLD Workshop@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*

(*equal contribution)

Awards and Academic Achievements

· **Financial Assistance** for attending ICLR'25 *2025*
· 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*

Service

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

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), Elliott Kau (USC BS-MS), Kameron Shahabi (USC BS-MS → UW PhD)
- Youqi Huang: SURE'23 and CURVE'23-24 research programs (USC BS), Luke Pratt: SHINE'22 summer research program (K-12 STEM outreach), Devin Martin: SURE'22 summer research program (USC BS)

Talks

· Transformers Learn Low-Sensitivity Functions: Investigations and Implications
EnCORE Workshop on Theoretical Perspectives on LLMs at UCSD March 2025
Seminars on Formal Languages and Neural Networks (FLaNN) June 2025