

Krishna Sri Ipsit Mantri

<https://ipsitmantri.github.io>

Google Scholar 

mantrik@purdue.edu

Education	Purdue University , West Lafayette, IN, United States Master of Science in Computer Science Specialization: Machine Learning GPA: 3.74/4.0	August 2023 - Present Graduation: May 2025
	Indian Institute of Technology Bombay , Mumbai, India Bachelor of Technology in Electrical Engineering GPA: 9.36/10.0 Minor Degrees: (1) Computer Science and Engineering (2) Artificial Intelligence and Data Science	Jul 2018 - May 2022
Scholastic Achievements	2024 NeurIPS Travel Award for presenting research on DiGRAF. 2023 Accepted to the Cornell, Maryland, Max Planck Pre-doctoral Research School at MPI-SWS, Saarbrücken, Germany. 2022 Perfect GPA of 10.0/10.0 in the final semester at IIT Bombay. 2018 Secured All India Rank of 242 in JEE Advanced (top 0.1% of candidates). 2016 KVPY Fellowship (declined), Government of India.	
Publications	Krishna Sri Ipsit Mantri , Carola-Bibiane Schönlieb, Bruno Ribeiro, Chaim Baskin, Moshe Eliasof. <i>DiTASK: Multi-Task Fine-Tuning with Diffeomorphic Transformations</i> . Under Review at CVPR, 2025 Krishna Sri Ipsit Mantri , Xinzhi Wang, Carola-Bibiane Schönlieb, Bruno Ribeiro, Beatrice Bevilacqua, Moshe Eliasof. <i>DiGRAF: Diffeomorphic Graph-Adaptive Activation Function</i> . Accepted at The 38th Annual Conference on Neural Information Processing Systems (NeurIPS), 2024 [arXiv] Krishna Sri Ipsit Mantri , Moshe Eliasof, Carola-Bibiane Schönlieb, Bruno Ribeiro. <i>Rethinking Fine-tuning Through Geometric Perspective</i> . Accepted In UniReps: 2nd Edition of the Workshop on Unifying Representations in Neural Models at NeurIPS 2024[OpenReview] Nevasini Sasikumar, Krishna Sri Ipsit Mantri , STAGCN: Spatial-Temporal Attention Based Graph Convolutional Networks for COVID-19 Forecasting, accepted for oral presentation at the 2023 ICLR First Workshop on Machine Learning & Global Health. [OpenReview] Pritish Chakraborty, Sayan Ranu, Krishna Sri Ipsit Mantri , Abir De, Learning and Maximizing Influence in Social Networks Under Capacity Constraints, accepted for publication at the 16th ACM International Web Search and Data Mining Conference (WSDM), 2023. [ACM]	
Research Experience	Multi-Task Fine-Tuning with Diffeomorphic Transformations Masters Thesis with Prof. Ribeiro, Prof. Baskin and Dr. Eliasof <ul style="list-style-type: none">Challenge: Existing parameter-efficient fine-tuning methods for Vision Transformers (ViTs), like LoRA, force tasks to compete within constrained subspaces, degrading performance in multi-task learning (MTL) settings.Key Insight: Task-specific adaptations can be achieved without altering pre-trained representations by leveraging singular value modulation through diffeomorphic transformations.Contribution: Developed a method that reduces parameter overhead by 75% while achieving a 26.27% improvement in average task performance on the PASCAL MTL benchmark.Impact: Positioned this work as a step towards resource-efficient, scalable fine-tuning for diverse tasks, with potential applications in fields like medical imaging and autonomous systems. Diffeomorphic Graph-Adaptive Activation Functions Graduate Research Project <ul style="list-style-type: none">Challenge: Traditional activation functions in Graph Neural Networks (GNNs) are static and fail to adapt to dynamic or irregular graph structures, leading to suboptimal performance in complex tasks like molecular property prediction.Key Innovation: Introduced DiGRAF, an activation function that adapts dynamically to graph topologies using diffeomorphic transformations, preserving essential geometric properties.	August 2024 - Present Purdue University December 2023 - May 2024 Purdue University

- **Outcome:** Enabled more expressive and flexible GNNs, demonstrating up to **4.7% improvement** over baseline methods. Work accepted to NeurIPS 2024.
- **Collaboration:** Worked with an international team, including Cambridge-affiliated researchers, to develop a framework that has implications for advancing drug discovery using GNNs.

Sony AI
Research Scientist Intern

May 2024 - August 2024
Tokyo, Japan

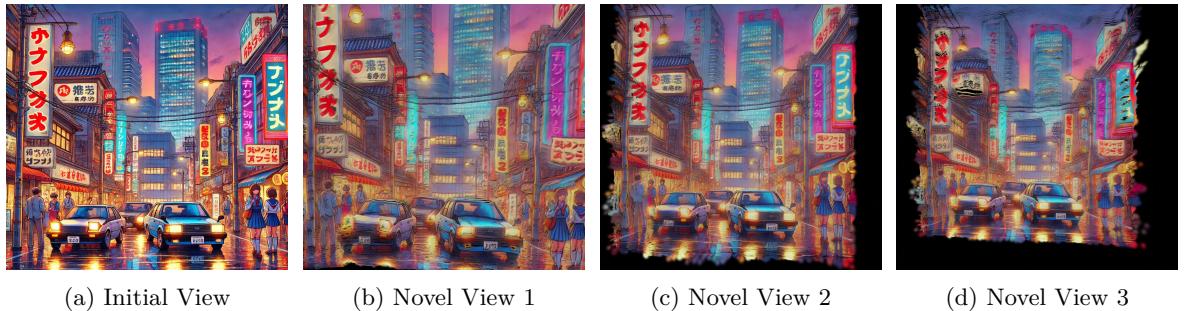


Figure 1: 3D Scene Reconstruction: Initial view and generated novel views.

- Pioneered a **deterministic zoom-enhancement framework** for single-image 3D reconstruction, addressing real-time challenges in gaming and virtual environments, without needing generative models.
- Applied **diffeomorphic transformations** to simulate diverse camera poses, enhancing the **robustness** and **realism** of single-view 3D reconstruction.
- Integrated the framework with **MVSplat**, achieving **120× speed improvement** over traditional synthesis methods and rendering high-quality scenes in **under 15 seconds**.
- Collaborated with Japanese colleagues in a multicultural, multilingual environment, gaining valuable experience in cross-cultural communication and team dynamics.

Professional Experience

Texas Instruments July 2022 - July 2023
Software Enginner, Power Interfaces Firmware Team Bangalore, India

- Automated the validation of firmware for Power Sourcing Equipment controllers (**TPS23881**), improving **coverage by 20%** using Pytest and Jenkins.
- Streamlined legacy manual testing workflows, boosting efficiency and ensuring state machine compliance across multiple test scenarios.
- Gained expertise in **PoE PSE specifications**, contributing to the debugging and development of cutting-edge firmware solutions.

Microsoft May 2021 – July 2021
Software Engineer Intern, Defensive Search @ Bing Hyderabad, India

- Automated the **query expansion pipeline** for Bing Safe Search, **enhancing the filtering** of racially inappropriate and derogatory content.
- Designed and implemented sampling techniques, **reducing query processing time by 62%**, significantly lowering crowdsourcing costs.
- Integrated the solution into Bing's **workflow manager**, improving operational scalability and safety compliance.

Leadership and Teaching

Class Representative, Electrical Engineering Department July 2020 – May 2022
Junior and Final Year, IIT Bombay Mumbai, India

- Elected as class representative, representing a cohort of **80** students during the **COVID-19 pandemic**.
- Facilitated online learning by addressing logistical and academic concerns with faculty, including **re-exams, exam schedules, and access to online classes** for students affected by the pandemic.
- Ensured clear communication between students and faculty, advocating for classmates' needs in a remote learning environment.

Teaching and Community Outreach

May 2020 – July 2022

- Volunteered to teach deep learning during the summer of 2020 as part of a professor-led initiative, offering free classes to the community of **200** undergraduates in India to foster learning opportunities during the pandemic. Website [🔗](#)
- Served as a **Teaching Assistant (TA)** at IIT Bombay, contributing to courses in Machine Learning, Ordinary Differential Equations, and Operating Systems.
- Tutored undergraduate students at Purdue University in **MATLAB programming** for Engineering 101 and **Data Structures and Algorithms**, enhancing their foundational understanding.

Projects

PropertyManager.ai – GenAI for Property Inspection	February 2024 – March 2024
Hacklytics 2024 Demo 🎥 Website 🔗 Code 🔗	
<ul style="list-style-type: none"> Built a multi-modal Generative AI solution to assess property damages and streamline insurance claims processing. Fine-tuned the BLIP text-to-image model using a custom dataset for damage identification and reporting. Designed few-shot prompting with GPT-4, providing tailored solutions aligned with insurance policies. 	
Diagnosing Supply Chain Optimization Problems using LLMs	August 2023 – May 2024
Department of Chemical Engineering, Purdue University	
<ul style="list-style-type: none"> Developed a GPT-4-powered chatbot to solve large-scale supply chain optimization problems using Mixed Integer Programming (MIP). Integrated advanced features like infeasibility troubleshooting, sensitivity analysis, and counterfactual reasoning. Proposed a novel framework leveraging code generation and Retrieval-Augmented Generation (RAG) for enhanced problem-solving. 	
Code Review Automation using LLMs and RAG	January 2024 – May 2024
CS 592 - AI-Assisted Software Engineering Seminar with Prof. Tianyi Zhang - Code 🔗	
<ul style="list-style-type: none"> Designed a multi-stage code review framework combining Retrieval-Augmented Generation (RAG) and LLMs (GPT-3.5, Mistral 7B, Llama 3 70B). Deployed as a GitHub App, automating pull request reviews to enhance code quality and developer productivity. Evaluated performance across LLMs of varying capacities, demonstrating effectiveness in real-world software workflows. 	
xkcd-style Comic Generation using T2I Models	January 2024 – May 2024
CS 587 - Foundations of Deep Learning with Prof. Raymond Yeh - Code 🔗	
<ul style="list-style-type: none"> Fine-tuned Stable Diffusion with LoRA on 2,240 comics to generate xkcd-style illustrations. Improved text coherence by training a ResNet-18 reward model and applying Direct Preference Optimization. 	

References

Dr. Moshe Eliasof	
Department of Applied Mathematics at University of Cambridge, Email: me532@cam.ac.uk.	
Prof. Bruno Ribeiro	
Department of Computer Science at Purdue University, Email: ribeirob@purdue.edu.	
Prof. Chaim Baskin	
School of Electrical and Computer Engineering at Ben-Gurion University of the Negev, Email: chaim-baskin@bgu.ac.il.	