SUMUKH K AITHAL

Pittsburgh, USA

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EDUCATION

Carnegie Mellon University *2023 - Present*
Masters of Science in Machine Learning GPA : 3.90/4.00

PES University *2018 - 2022*
Bachelor of Technology (Honors) in Computer Science and Engineering GPA : 9.83/10

RESEARCH & WORK EXPERIENCE

Princeton University June 2024 - Aug 2024
Visiting Researcher *Princeton, USA*
Advisor: Prof. Sanjeev Arora

· Currently working on improving mathematical reasoning capabilities of large language models.

Carnegie Mellon University Aug 2023 - Present
Graduate Researcher *Pittsburgh, USA*
Advisor: Prof. Zico Kolter

· Discovered and analyzed a novel failure mode in diffusion models, termed 'mode interpolation,' that leads to hallucinations in diffusion models [1]. This work is under review.

Fujitsu Research India Sept 2022 - Apr 2023
Applied Researcher II *Bengaluru, India*

· Designed a novel Semantic Graph Consistency module for self-supervised learning with vision transformers, enhancing representation quality and improving performance on downstream tasks.

Mila - Quebec AI Institute May 2022 - Oct 2022
Research Intern *Remote*
Advisors: Prof. Yoshua Bengio and Dr. Anirudh Goyal

· Leveraged insights from biological vision to integrate depth cues into self-supervised learning frameworks, improving their robustness and generalization [2] (with Alex Lamb and Michael Mozer).

Vision and AI Lab, Indian Institute of Science May 2020 - May 2022
Research Intern *Bengaluru, India*
Advisor: Prof. R Venkatesh Babu

· Conducted research on Long-Tailed Learning (NeurIPS 2022 [3]), Domain Adaptation (ICML 2022 [4]), and Active Domain Adaptation (ICCV 2021 [5]).

SELECTED PUBLICATIONS **(* indicates equal contribution)**

[1] **Understanding Hallucinations in Diffusion Models through Mode Interpolation**
Sumukh K Aithal, Pratyush Maini, Zachary C. Lipton, J. Zico Kolter
*Accepted in the **ICML 2024 Workshop** on Geometry-grounded Representation Learning and Generative Modeling* and *DMLR Workshop*. [Paper] [Code]

[2] **Leveraging the Third Dimension in Contrastive Learning**
Sumukh K Aithal, Anirudh Goyal, Alex Lamb, Yoshua Bengio, Michael Mozer
*Accepted in the **NeurIPS 2022 Workshop**: Self-Supervised Learning - Theory and Practice.* [Paper]

[3] **Escaping Saddle Points for Effective Generalization on Class-Imbalanced Data**
Harsh Rangwani*, **Sumukh K Aithal***, Mayank Mishra, R. Venkatesh Babu
*In Neural Information Processing Systems (**NeurIPS**) 2022.* [Paper] [Code]

[4] **A Closer Look at Smoothness in Domain Adversarial Training**
Harsh Rangwani*, **Sumukh K Aithal***, Mayank Mishra, Arihant Jain, R. Venkatesh Babu
*In International Conference on Machine Learning (**ICML**) 2022.* [Paper] [Code]

[5] **S^{3}VAADA: Submodular Subset Selection for Virtual Adversarial Active Domain Adaptation**
Harsh Rangwani, Arihant Jain*, **Sumukh K Aithal***, R. Venkatesh Babu
*In International Conference on Computer Vision (**ICCV**) 2021.* [Project Page]

[6] **Robustness to Augmentations as a Generalization metric**
Sumukh Aithal K*, Dhruva Kashyap*, Natarajan Subramanyam
***1st Runner Up** in Predicting Generalization in Deep Learning, **NeurIPS 2020 Competition** Track* (Team "Always Generalize") [Paper] [Code] [Video]

ACHIEVEMENTS

Award for Academic Excellence, PES University: Ranked 6th out of 975 students (Top 1%) in the Computer Science department — Sept 2022
Kaggle Competition Expert: Ranked among top 2% of Kaggle participants. — [Profile]
CNR Rao Scholarship: Awarded to top 1% of the students at PES University. — 2018-2022
Intel - PESU Student Contest: Awarded Best Completed Submission among 70 teams for the project on low light object detection. — May 2019
Karnataka Common Entrance Test: Rank 383 out of 0.2 million students. — Apr 2018

RELEVANT COURSEWORK

Carnegie Mellon University: Probability and Mathematical Statistics (36700), Visual Learning and Recognition (16824), Convex Optimization (10725), Probabilistic Graphical Models (10708).
PES University: Machine Intelligence, Topics in Deep Learning, Big Data, Operating Systems, Linear Algebra, Practical Reinforcement Learning, Advanced Algorithms.

TECHNICAL SKILLS

Programming Languages	Python, C, C++
Tools and Frameworks	PyTorch, Keras, OpenCV

ADDITIONAL EXPERIENCE

- **Reviewer**: ICML 2022 - 2024; NeurIPS 2022 - 2024; ICCV 2023, ICLR 2024.
- **Contributed to torchvision library**: Added support for German Traffic Sign Recognition Benchmark (GTSRB) Dataset in torchvision (11k+ stars) library. [Link]
- Attended Research Week with Google 2022 organized by Google Research India.
- Attended Eastern European Machine Learning (EEML) Summer School in 2021.
- Attended CIFAR Deep Learning + Reinforcement Learning (DLRL) Summer School in 2021.
- Volunteered for the project at Mila: COVI Canada: Peer-to-peer AI-based tracing of COVID-19.