Saaketh Medepalli

Curriculum Vitae

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Education

Aug 2023 – May 2025 **Master of Science in Machine Learning (MSML)**, *Carnegie Mellon University*, School of Computer Science.
Responsibilities: MSML Social Chair (organizing events, coordinating budget)
Relevant Coursework: Probability and Mathematical Statistics, Advanced Introduction to Machine Learning, Deep Learning Systems, Representation/Generation in Neuro & AI

Sep 2019 – Dec 2022 **Bachelor of Science in Electrical Engineering**, *University of Michigan*, College of Engineering, *Summa Cum Laude*.
Honors: Donald D. Dodge Scholarship, University of Michigan Regents Scholarship
Relevant Coursework: Deep Learning for Computer Vision, Mathematical and Computational Neuroscience, Data Structures and Algorithms

Research Experience

Jan 2024 – Present **Research Assistant, Prof. Leila Wehbe's Group**, *Carnegie Mellon University*, Pittsburgh, PA.
- Developed data pipeline in Python for preprocessing in-house MEG (magnetoencephalography) data for a language comprehension task using signal processing/compression methods
- Built encoding models to study empirical questions regarding the alignment of Large Language Model (GPT-2) embeddings and MEG data across several subjects' brains

Jan 2022 – Feb 2023 **Research Assistant, Prof. Qing Qu's Group**, *University of Michigan*, Ann Arbor, MI.
- Conducted experiments in PyTorch to track role of neural collapse under adversarially (FGSM, PGD) trained ResNet models on CIFAR-10, CIFAR-100 and ImageNet datasets
- Extended idea by conducting literature review and running ablation experiments in PyTorch to investigate role of neural collapse in meta-learning models (ProtoNets)

Jun 2022 – Aug 2022 **Summer Intern, Visual Behavior Team**, *The Allen Institute, MindScope Program*, Seattle, WA.
- Developed encoding models (GLMs) in Python to test function of VIP (Vasoactive Intestinal Polypeptide-expressing) neurons in mouse visual cortex using 2-photon Ca^{2+} imaging data
- Analyzed results using statistical analyses, including explained variance and image selectivity/specificity metrics
- Presented results at internal presentation and flash talk at Neuromatch conference 2022

Nov 2020 – May 2022 **Research Assistant, Prof. Wei Lu's Group**, *University of Michigan*, Ann Arbor, MI.
- Spearheaded idea to use memristor crossbar architecture to emulate neocortex using Hierarchical Temporal Memory models and helped implement experiments in Python

Publications

[1] **Saaketh Medepalli** and Naren Doraiswamy. On the role of neural collapse in meta learning models for few-shot learning, 2023.

[2] Sangmin Yoo, Yongmo Park, Ziyu Wang, Yuting Wu, **Saaketh Medepalli**, Wesley Thio, and Wei D. Lu. Columnar learning networks for multisensory spatiotemporal learning. *Adv. Intell. Syst.*, 4(11), 2022.

Teaching Experience

Jan 2022 – May 2022 **EECS 351: Digital Signal Processing Instructional Aide**, *University of Michigan*, Ann Arbor, MI.

- Organized and led weekly discussion sections for 70 students, hosted weekly office hours for questions
- Advised ∼15 project groups for a final project spanning signal processing applications in audio & image domains

Aug 2020 – Dec 2020 **EECS 200: Electrical Engineering Systems Design I**, *University of Michigan*, Ann Arbor, MI.

- Taught 2 lab sections of ∼6 students involving a robot and utilizing C, Arduino and Python programming, as well as circuit design, control, and signal processing tools
- Evaluated and restructured class during weekly meetings with instructor to enhance students' learning experience

Professional Experience/Service

March 2024 – April 2024 **Neuromatch NeuroAI Course Contributor**, *Neuromatch Academy*, Remote.

- Contributed to the development of the inaugural Neuromatch NeuroAI course by creating and reviewing content for the Microcircuits lecture
- Crafted a Jupyter notebook and conducted toy experiments to demonstrate the role of sparsity on attention in the brain/AI

May 2023 – Aug 2023 **R&D Machine Learning Subcontractor**, *Sandia National Laboratories*, Albuquerque, NM.

- Designed and implemented machine learning/signal processing pipeline in PyTorch from scratch to detect anomalies in time-series infrasound data
- Built a GUI in Python to assist experts in hand labeling raw data for dataset curation

Languages

Python	Proficient (5+ years experience)
C++	Intermediate (3+ years experience)
Java	Intermediate (2+ years experience)
MATLAB	Intermediate (2+ years experience)

Computer skills

Development	Bash/Zsh, Git, Vim	**Web Dev**	HTML, CSS
Libraries	NumPy, PyTorch, Scikit-learn, TensorFlow, Pandas	**Cluster Computing**	Slurm
Typesetting	LaTeX	**Visualization**	Matplotlib, Seaborn

Awards

2023, *U*	William L. Everett Student Award for Excellence	*Awarded to 1 senior in major*
2022, *U*	Hugh G. Rumler Award Finalist	*Among ∼10 finalists in college*
2022, *U*	Outstanding Research Award	*Awarded to 1 student in major*
2021, *U*	A.D. Moore Award Finalist	*Among ∼10 finalists in college*
2019, *H*	Intel International Science and Engineering Fair Finalist	
2019, *H*	USACO Gold Division Participant	
2018, *H*	Michigan Mathematics Prize Competition	*Top 100 in Michigan*

U = Undergrad, H = High School

Projects

Dec 2023 **Sparse NDArray Library (DLSys Project)**
Developed a sparse NDArray library in Python, C++, CUDA for a custom deep learning library to optimize memory usage and computation time on matrix operations.

Sep 2023 **Interpretable Medical Image Classifier (HackAuton)**
Worked on a team of 3 to build an interpretable medical image classifier built on top of a "white-box" vision transformer. See here for more.

May 2022 **Spatial Audio Simulator (Senior Design)**
Developed the software on an audio processing system in Python for real-time spatial audio using head-related transfer functions (HRTFs).

Dec 2021 **Engram Network**
Built a Hodgkin-Huxley network model in Python to understand the computations underlying correlations between engrams in Lateral Amygdala (LA).

May 2021 **Mood Classifier**
Created a music classifier involving audio dataset curation, DSP feature extraction (Spectral Centroid/Bandwidth, MFCC, Chromogram) and classification (k-NN, SVM, MLP).