Aaditya Prasad

PhD Student - Brain & Cognitive Sciences (BCS) Department, Massachusetts Institute of Technology (MIT)

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Education

August 2024 - Present
Massachusetts Institute of Technology
Doctor of Philosophy (PhD), Brain and Cognitive Sciences
Advisor: Steve Flavell

September 2022 - March 2024
University of California San Diego
Masters of Science (M.S.), Data Science
Thesis: *DREEM - A deep learning system for tracking biological agents at any spatiotemporal scale*

September 2019 - June 2022
University of California San Diego
Bachelors of Science (B.S.), Bioinformatics

Work Experience

November 2021 - Augurst 2024
Talmo Lab, Salk Institute for Biological Studies
Research Assistant

- Spearheaded the development of DREEM, a **deep-learning** based tool using **transformers** for **automatic** multiple object tracking in biological videos such as animal behavior and live cell microscopy experiments.
- Led project focused on understanding the role of natural image statistics in the formation of biologically plausible neural representations of **convolutional neural network** (CNN) models of the mouse visual cortex. [1]
- Trained **self-supervised** CNNs such as **AlexNet** with **contrastive learning** objectives like **SimCLR** with **PyTorch**, and **torchvision**.

September 2020 - August 2024
Manor Lab, Salk Institute for Biological Studies/University of California San Diego
Research Assistant

- Leveraged **deep learning** model based on a **U-Net** architecture with a **novel** auxiliary learning tasks known as **local shape descriptors** (LSDs) for **automatic 3d instance and semantic segmentation** of neuronal mitochondrial populations in electron microscopy imaging.

June 2023 - August 2023
Laboratory for Neural Statistics, Flatiron Institute Center for Computational Neuroscience
Summer Research Associate

- Lead efforts to design **multimodal deep learning** approaches to **ultrasonic sound source localization** in longitudinal behavioral videos for the study of the neuroethology of rodent vocalizations.
- Designed **contrastive audio-visual pretraining** network on a **single** gpu with $<$ **10 gb** of VRAM using **gradient caching**.
- Developed Audio-Visual based **active speaker detection network** in animals using **cross attention** which achieved **state-of-the-art accuracy of over 90%**.

June 2021 - June 2022

Mesirov Lab, Moore's Cancer Center
Undergraduate Research Assistant

- Led bioinformatics project investigating the role of the *MICAL2* gene in pancreatic cancer metastasis.
- Leveraged differential sequence analysis and network propagation techniques to uncover protein-protein interactions with *MICAL2*.

January 2020 - September 2020

Panda Lab, Salk Institute for Biological Studies
Undergraduate Research Assistant

- Reconstructed a melanopsin signalling pathway from over 900 3D electron microscopy images.

Publications

2022

1. **Prasad, A.**, Manor, U. & Pereira, T. *Exploring the role of image domain in self-supervised DNN models of rodent brains* in *SVRHM 2022 Workshop @ NeurIPS* (2022).

Posters

2022

Prasad, A., Manor, U., & Pereira, T. *Exploring the role of image domains in self-supervised DNN models of rodent brains*, *COSYNE* (2022)

Leadership and Teaching Experience

June 2021 - June 2022

Undergraduate Bioinformatics Club at UCSD
Vice President External

- Responsible for overseeing Chalk Talk **seminar series**, bioinformatics **workshops**, **industry recruiting** talks, **community service** events, socials, and **collaborations** with other UCSD clubs.

January 2021 - June 2022

Computer Science and Engineering Department, UCSD
Undergraduate Tutor

- Tutored CSE 100: **Advanced Data Structures** taught by Professor Niema Moshiri and Paul Cao for 4 consecutive quarters as well as CSE 6R: **Introduction to Computer Science and Object-Oriented Programming: Python** during its first offering.
- Lead lab hours for **one-on-one** teaching and helping students with code, **stress-tested** programming assignments and **proof-read** written tests, answered questions on class discussion board.
- Taught object-oriented programming in **C++** covering subjects such as **binary trees**, **graph algorithms**, **tries**, and **fast-string searching**.

June 2020 - June 2021

Undergraduate Bioinformatics Club at UCSD

Academic Relations Chair

- Organized a series of chalk talks from professors throughout UCSD computational biology research community.
- Started journal club discussing current computational biology research.
- Moderated alumni panels and resumé workshops.