Pranav Mahableshwarkar

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Skills and Awards

Languages: Python, C/C++, Bash, SLURM, CUDA, Docker, SQL, R

Frameworks/Libraries: PyTorch, TensorFlow/Keras, Pandas, Numpy, Matplotlib, Git, OpenMM, AWS

Awards: Computer Science Senior Prize, Sigma Xi Inductee, 2x Undergraduate Teaching & Research Award Recipient

Deep Learning and Computational Genomics Research

Pipeline for Contrastive Modality Evaluation *(publication in prep)* Singh Lab at Brown

- Developed a scalable multi-modal contrastive learning framework for health data (MIMIC-IV/CXR).
- Evaluated all 25 modality combinations, scoring individual modality contributions in contrastive learning.
- Leveraged scores as a prior for SOTA integration of modalities in downstream fine-tuning contexts.

Subspace Relaxation Operator for Protein Folding *(publication in prep)* Istrail Lab at Brown

- Used molecular dynamics to generate a dataset linking AlphaFold embeddings to improved structural outputs.
- Trained an attention-based model with DDP to apply physical transformations within the embedding space.
- Transformed structures yield context-specific (i.e. pH) structural changes and lower energy conformations.
- Collaborating with structural biologists to to experimentally validate solvent-specific structural predictions.

DNABERT-Enhancer Ovcharenko Group at NIH

- Interpretable transformer model for robust classification (AUROC $> 90\%$) of poised and active enhancer regions.
- Attention landscapes reveal class-specific motifs/functional enrichments along with a novel class of enhancers.

BindCompare *(published in Bioinformatics)* Larschan Lab at Brown

- Developed a PyPI package to identify locations where gene regulation and RNA processing are coupled.
- Back-end applies interval trees to rapidly select/analyze candidate co-regulators from thousands of sites.
- Working with wet lab scientists to validate candidates in-vivo using SPRITE-IP experiments.

Experience

Software Engineering Intern | insitro 2024

- Developed a literature-review RAG chatbot indexing 36 million papers on PubMed; used by over 30 researchers.
- Utilized AWS and python software packages to accelerate machine learning research at insitro.

Deep Learning Intern | National Institutes of Health 2023

- Investigated regulatory genomics mechanisms in the Ovcharenko group using various deep learning approaches.
- Parallelized GPU infrastructure on NIH's HPC systems to decrease training time by 4X.

Undergraduate Researcher | Brown University 2022 - Present

- Conducting novel research in deep learning and computational biology.
- Collaborated with multiple graduate students and labs; oral and poster presentations at international conferences.

Undergraduate Teaching | Brown University Computer Science and Biology 2022 – Present

- *Deep Learning Head TA*: Led a team of 33 TAs to develop and run CS1470 for 350+ undergraduates/graduates.
- Developing a new Machine Learning in Health and Biology course with Professor Ritambhara Singh.
- *Undergraduate TA*: Advanced Algorithms in Computational Biology and Medical Informatics, Computational Molecular Biology, Fundamentals of Computer Systems, Genetics.

Education

Brown University Providence, RI

BS in Computer Science, *BA* in Applied Math; GPA: 4.0 *2021 - 2025*