Sam Boshar

sboshar@mit.edu | 978-482-6372

EDUCATION

Massachusetts Institute of Technology

Masters of Engineering in Computer Science 5/2024

B.S., Double Major in Computer Science and Math, Minor in Brain Cognitive Science (GPA 4.9/5.0) 5/2023

- D1 Men's Varsity Lightweight Crew (Captain)
- Coursework: Optimization, Probability, Computation Structures, Algorithms, General/Algebraic Topology, Software Construction, Combinatorial Analysis, Deep Learning (G), Statistical Learning Theory (G), Stochastic Processes (G)

Phillips Academy Andover 6/2019

WORK EXPERIENCE

InstaDeep Ltd (BioNTech)—Masters of Engineering Co-op 6/2023 – 5/2024

ML Research Intern

- Researching how foundation language models trained on whole genomes (gLMs) understand proteins
- Curated and released the first 'true' CDS benchmark for various protein tasks
- Studied the impact of synonymous codon mutation in CDS on gLM performance
- Conducted extensive benchmarking via multi-tpu/node pre-training and fine-tuning

Dyno Therapeutics, Inc. 6/2022 – 8/2022

ML Research Intern

- Implemented generative methods for viral protein capsid design via large sequence models
- Led exploration of LLMs for modeling fitness functions, outperforming previous methods
- Implemented supervised contrastive loss, demonstrating superior ranking performance, especially in data scarce domains

MIT Computer Science and Artificial Intelligence Lab - Antonio Torralba Lab 1/2020 – 8/2021

Undergraduate Researcher

- Implemented RL algorithms for novelty robust navigation in minecraft-like world
- Built software for novelty injection and navigation interpretability
- Implemented general methods for network dissection, evaluating alignment between hidden units and semantic ideas
- Applied techniques to identify/contrast concepts learned by neurons in image classifiers trained on real vs synthetic data.

MIT Synthetic Biology Group - Tim Lu Lab 9/2019 – 3/2020

Undergraduate Researcher

- Studied the impact of antibiotic concentration on E. coli density fluctuation for periodic therapy release
- Researched methods for tumor therapy via intravenous injection of programmable bacteria and antibiotic-induced lysis.

RELEVANT PROJECT EXPERIENCE

MIT Department of Mathematics 6/2021 – 1/2022

Directed Research Project in Quantum Computation

Self-taught quantum computing via Nielsen & Chuang, including quantum mechanics, complexity, computation, information and cryptography; Presented animated symposium presentation on quantum key distribution (BB84).

Reinforcement Learning Visualizer Summer 2020

Worked in a team to create a 'gridworld' visualization to teach the intuition behind RL, allowing users to visualize, compare and test solutions of common algorithms, including value iteration, SARSA, Q-learning, and REINFORCE.

Medium Articles Summer 2020

Authored articles on linear algebra, algebra, functions, set theory, with more coming in other subjects that interest me! https:// sam-boshar.medium.com/

HONORS & AWARDS

Varsity Rowing Captain | Most Inspirational Brother Award 2023 (ΦΣΚ) | Most Inspirational 2022 (MIT Rowing)

SKILLS

Languages: Python, Java, Typescript, Javascript, HTML, CSS, Julia

Tools: Pytorch (Lightning), Jax/Haiku, GCP, Git, Gitlabs/Github, Pandas, Numpy, TMUX, Hugging Face, Jupyter, Conda, Docker

Other: UniProt, EMBL, RCSB PDB