Stewart Slocum

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Education

B.S. Computer Science, Applied Math and Statistics, *Johns Hopkins University* **Graduating May 2021**

GPA: 3.76

Selected Coursework: Unconstrained Nonlinear Optimization, Constrained Nonlinear Optimization, Foundations of RL (see final project on meta-learning), Statistics, Deep Learning, Real Analysis, Deep Learning in Discrete Optimization (see final project on ML-guided optimization for protein design), Algorithms, Parallel Programming, Molecules and Cells

Work Experience

Dr. Rene Vidal Lab, JHU, *Undergraduate Research Assistant* **Fall 2020 -**

Co-leading a project developing practical first-order optimization algorithms with linear convergence on broad classes of functions - inspired by a continuous time perspective, Hamiltonian dynamics, and convex conjugates. Also experimenting with a meta-learning approach. Contributions include proposing new algorithms, theoretical analyses, and performing large-scale deep learning experiments on image classification, language modelling, and generative modeling problems. Also working on a project using generative modeling to learn semantic representations for images and text.

Dyno Therapeutics, *Machine Learning Intern* **Summer 2020**

Worked on sequence proposal strategies for Dyno, an ML startup designing viral vectors for gene therapy. Built algorithms using discrete optimization methods, generative models, and reinforcement learning to propose high-scoring viral capsid sequences with respect to trained property predictors. Also created heuristics to validate methods and detect adversarial sequences. Also built the company's first end-to-end ML pipeline. Contributions were key to the design of two novel deep learning-driven libraries of viral vectors, targeting the nervous system and muscle tissue. Work developed into a paper where I helped build an open-source benchmarking environment (https://github.com/samsinai/FLEXS) for biological sequence design problems: https://arxiv.org/abs/2010.02141. Further efforts building on this work led to an oral presentation at ASGTC 2021: Risk-Adjusted Selection for Validation of Sequences in AAV Design Using Composite Sampling.

Universidad del Valle, Cali, Colombia, *Machine Learning Research* **Winter 2020**

Short-term research project with La Universidad del Valle's CIBioFi. I led the development of a machine learning system for downscaling medium-range precipitation forecasts using random forests and geospatial satellite data.

NASA Goddard Space Flight Center, *Quantum Computing Research Intern* **Summer 2019**

Contributed to the development of a quantum annealing solver on the D-Wave quantum computer for protein design problems. Designed and ran numerical experiments to characterize performance scaling and to understand which aspects of a problem instance most affected performance. Contributed a heuristic to find good hyperparameters before submitting the problem to the quantum annealer, improving performance by an order of magnitude. Our method is one of the first successful applications of quantum computing to an real-world problem of meaningful size. Included in our paper is the first quantum-designed peptide, a 16-residue molecule with an exotic mirror symmetry whose structure was confirmed experimentally. Currently in preparation for journal submission: https://www.biorxiv.org/content/10.1101/752485v1

NASA Goddard Space Flight Center, *Virtual Reality Software Engineering Intern* **Summer 2017 and 2018**

Built Virtual Reality scientific visualization tools to study point cloud data with applications in astrophysics, marine biology, and planetary science. Presented at the 48th Lunar and Planetary Science Conference.

Projects

SAIL (Socratic Artificial Intelligence Learning) **October 2018 -**

Developed a voice application to improve medical education. SAIL is a conversational voice interface to prepare medical students and orthopedic residents for board exams, evaluating user understanding with pre-trained language models and transfer learning methods. SAIL has received $40,000 funding from a 2020 DELTA Grant as well as from Orthobullets and the Johns Hopkins Department of Orthopedic Surgery.

See more of my work on GitHub! https://github.com/stewy33

Skills

- PyTorch, Tensorflow, numpy, TF-Agents, Python, C/C++, Google Cloud, Kubeflow, Rosetta Protein Suite
- Front-end Web Dev (Javascript, React, HTML & CSS), Haskell, C#, Java, and 3D Game Programming (Unity, Unreal)

Ask for references, they would love to tell you about me!