

Jonathan Deaton

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EXPERIENCE

Research Engineer

Google X

November 2021 – Present

Mountain View, California

- Prototyped and delivered diverse ML approaches for biological sequence design including:
 - * Fine-tuned BERT-like model which significantly outperformed our team's existing methods in molecular design by increasing experimental hit-rate from 58% to 96%
 - * Transfer learning with BERT LM with semi-supervised pre-training on large biological sequence datasets which eliminated dependency on data from one type of experimental assay
 - * GPT-like LLM with RLHF fine-tuning to accelerate computational identification of candidate molecules
 - * Equivariant graph neural networks for structure-based molecular design
- Designed and built Large Language Model distributed training system in JAX. Accelerated rapid prototyping of ML algorithms for molecular design by integrating with T5 architectures, reducing training time by ~5x, and increasing algorithmic expressiveness and data-scaling

Software Engineer

Google Health / Research

September 2019 – November 2021

Palo Alto, California

- Led development of software systems for validation of ML models
- Contributed to productionization of computer-vision dermatological condition classification system thereby achieving regulatory approval as CE-marked Class I medical device
- Conducted research advancing of state-of-the-art computer-vision models and published research findings on long-tail class-imbalance

Graduate Research Assistant

Stanford Network Analysis Platform

January 2018 – April 2018

Stanford, CA

- Transformed 2TB of Reddit user data by building a highly parallelized processing system. Enabled construction of user-interaction graph

Undergraduate Bioengineering Researcher

Quake Lab

June 2014 – June 2017

Stanford, CA

- Identified novel bacteriophages in metagenomic sequence data by developing data-analysis, visualization, and ML software in Python
- Performed molecular biology laboratory experiments including cell culture, qPCR, DNA sequencing, microfluidic device fabrication
- Communicated scientific findings in academic conferences, lab meetings, and publications

Research Associate Intern

Illumina, Protein Engineering Group

June 2016 – September 2016

San Diego, California

- Developed algorithm in Python for quantifying decay in DNA sequencing data quality
- Performed laboratory experiments to optimize assays for human exome sequencing

EDUCATION

Stanford University

MS in Computer Science, Artificial Intelligence

January 2018 – June 2019

Stanford, California

- GPA: 3.957 / 4.0
- Course Assistant: CS 140: Operating Systems, CS 161: Design and Analysis of Algorithms
- Coursework: Probabilistic Graphical Models, Machine Learning Theory, Deep Learning, Reinforcement Learning

Stanford University

BS in Bioengineering with Honors

September 2012 – March 2018

Stanford, California

- GPA: 3.839 / 4.0
- Research thesis: Identified Bacteriophage genomes in metagenomic sequencing data with machine learning

PUBLICATIONS

- Big Self-Supervised Models Advance Medical Image Classification. Azizi S, Mustafa B, Ryan F, Beaver Z, Freyberg F, **Deaton J**, Loh A, Karthikesalingam A, Kornblith S, Chen T, Natarajan V, Norouzi M. International Conference on Computer Vision 2021.
- Underspecification Presents Challenges for Credibility in Modern Machine Learning. D'Amour A, Heller K, et al. Journal of Machine Learning Research, 2020.
- Addressing the Real-world Class Imbalance Problem in Dermatology. Weng WH, **Deaton J**, Natarajan V, Elsayed GF, Liu Y. NeurIPS Machine Learning for Health Workshop 2020.
- Mini-Metagenomics and Nucleotide Composition Aid the Identification and Host Association of Novel Bacteriophage Sequences. **Deaton J**, Yu F, Quake S. Advanced biosystems, 2019.

PROJECTS

Transformer Pointer-Generator Networks for Summarization

Stanford CS 224N Course Project

- Implemented fusion of Transformer Encoder/Decoder and pointer-generator network for text summarization
- Successfully trained novel deep network architecture with low compute resources

AgarLE: Competitive Multi-Agent RL Environment

Personal/FOSS Project

- Build high-performance multi-agent reinforcement learning environment in C++
- Benchmarked state-of-the-art RL methods such as Proximal Policy Optimization and Deep-Q Learning

Heat Stroke Risk Monitor

Bioengineering Senior Capstone

- Led team of three in designing, building, and testing wearable heat stroke risk monitor
- Developed and validated machine learning algorithm to predict user risk in real time
- Featured at Rice 360 Global Health Competition, 2017 Tau Beta Pi Engineering Showcase