Alexander Morgan

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Education

Massachusetts Institute of Technology — Cambridge, MA
Ph.D. in Electrical Engineering and Computer Science. GPA: 5.0 — *Sept. 2022 – Present*

- Advisor: Lizhong Zheng
- Research: Information Theory and Statistical Inference
- Graduate Coursework: Inference and Information, Machine Learning, Non-Asymptotic Mathematical Statistics, Algorithm Engineering, Discrete Probability and Stochastic Processes, Nonlinear Optimization, Principles of Digital Communication, Algorithms for Inference, Fundamentals of Probability, Computer System Architecture

University of Southern California — Los Angeles, CA
B.S. in Electrical and Computer Engineering, Minor in Physics. GPA: 4.0 — *Sept. 2019 – May 2022*

- Graduate Coursework: Probability, Linear Algebra, Computational Deep Learning, Classical Mechanics, Electrodynamics, Quantum Mechanics
- Undergraduate Coursework: Parallel and Distributed Computing, Data Structures and Object-Oriented Design (C++), Software Development, Computer Systems, Digital Signal Processing, Distributed Systems and IoT, Embedded Systems

University of Minnesota, Twin Cities — Minneapolis, MN
Concentration in Math and Physics. GPA: 3.98 — *Sept. 2017 – May 2019*

- Undergraduate Coursework: Probability, Stochastic Processes, Abstract Algebra, Partial Differential Equations

Experience

Research Intern — May 2024 – Aug. 2024
Systems and Technology Research — *Woburn, MA*

- Developed hybrid nested-H-score network architectures to simultaneously learn modal decompositions of joint probability distributions and extract conditional distribution estimates
- Designed methods for detecting anomalous simulated GPS data by measuring and appropriately weighting shifts in H-score feature space

Research Intern — May 2023 – Aug. 2023
Systems and Technology Research — *Woburn, MA*

- Developed neural networks to extract low-dimensional feature representations of artificially generated GPS data, revealing subpopulation structure among simulated agents (PyTorch)
- Leveraged nested-H-score metric to minimize information loss associated with these feature representations and to impose orthogonality constraints

Electrical Engineering DSP Intern — May 2022 – Sept. 2022
Marvell — *Santa Clara, CA*

- Simplified and restructured internal C++ framework used to create, specify, simulate, and verify filters and other processing components designed by the automotive DSP team
- Converted data-driven processing model into a clock-driven model to better emulate hardware designs and solve circular dependency issues

Electrical Engineering Intern — June 2021 – Aug. 2021
Trellisware — *San Diego, CA*

- Launched network analytics initiative by developing tools to analyze data collected by Trellisware radios (Python, Pandas, NumPy)

Projects

MIT Pokerbots 2023 | *C++* — Jan. 2023 – Feb. 2023

- Collaborated with friends to apply Monte Carlo Counterfactual Regret Minimization to 2023 Pokerbots variant
- Finished in the top 20 out of 95 teams (exact position unknown) and won a language placement award

Technical Skills

Languages: Python, C++, C, LaTeX
Libraries: PyTorch, NumPy, pandas, Matplotlib
Other: Git, VS Code, Linux