Michael Einhorn

einhorn.michael1@gmail.com
https://michaeleinhorn.github.io/Portfolio/

Skills

- Python, C, C++, C#, Java, R
- Julia, SQL
- AWS Serverless Development
- Linux Shell Scripting
- Agile Methodology and Unified Modeling Language
- Software Testing with Junit
- Machine Learning, Computer Vision, Natural Language Processing
- PyTorch, Keras, TensorFlow
- Finetuning large models with Deepspeed
- Linear Algebra and Differential Equations
- Data Preprocessing
- Data Visualization in PyPlot and GGPlot
- Parallel Processing with CPU Multithreading, GPU CUDA, and MPI Distributed Computing

Education

Georgia Institute of Technology, College of Computing, Graduated May 2023
Major: Computer Science, GPA: 3.90
Concentrations: Artificial Intelligence, Modeling and Simulation

Work Experience:

Stanford Existential Risk Initiative Machine Learning Alignment Theory Scholars: Fall 2022
Machine Learning Engineer on a multidisciplinary team in Berkeley and London. Finetuned Language Models GPT-Neo 1.3B and GPT-Neox 20B with PPO using Deepspeed to play text adventures. Tested KL divergence and prompt engineering.

Undergraduate Researcher, Georgia Tech COAR Lab: Spring 2022 - 2023
Tested for convergence and linear speedup for federated reinforcement learning using Tabular Q-learning, and Convolutional Networks with PPO. Analyzed results in R and wrote an Undergraduate Thesis.

ML Engineer Intern, Georgia Tech Research Institute CIPHER: Fall 2021
Developed methods to accurately determine scaling laws for neural networks to predict the amount of data needed and evaluate improvements to scaling laws. Used this procedure to test Resnet with Mixup data augmentation on the CIFAR-10 image datasets. Analyzed data with regression in R using blocking to incorporate results from multiple different experiments. Tested for heteroskedasticity and non-normality of residuals and adjusted with Iteratively Reweighted Least Squares. Wrote report on results.

AWS Developer Intern, Orca IoT: Spring and Summer 2021
Developed and code reviewed production software for management of construction sites. Developed Serverless APIs with Python using AWS Lambda, and Cloud Formation. Deployed a Yolo model in AWS Neuron which was both more accurate and less expensive than AWS Rekognition analyzing our in-house dataset. Created a marketing tech demo for visualizing object detection boxes with real data in the SQL server. Tested models on edge devices such as Coral TPU and Jetson Nano.

Undergraduate Researcher, CHAT (Cetacean Hearing and Telemetry): Spring 2021
Developed an AI application to facilitate real time communication with dolphins. Used Cascade Classifier in OpenCV to detect dolphin whistles in a spectrogram. Tested data preprocessing, and hyperparameters for Precision, Recall, and Inference Time. Debugged multithreaded C code with Valgrind.

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Georgia Institute of Technology CS Coursework:

Natural Language Processing:

Implemented models and algorithm's such as LSTMs, Attention, Beam Search, Part of Speech Tagging and Classification. Worked on a team project to use a variation of Tuned Lens to interpret Language Models.

Machine Learning and Intro to AI:

Programmed in Python using NumPy. Implemented models and algorithms such as A* Search, Gaussian Mixture Model, Decision Trees, Reinforcement Learning, Semi-Supervised Learning, and Neural Networks. Worked on a semester team project with Semantic Segmentation using Convolutional Neural Networks. After training on labeled images of pet cats and dogs, the model was able to generalize to segment images of wildlife such as elk, bears, and birds.

Perception and Robotics:

Modeling robot perception and planning using probability theory. Projects include using maximum a posteriori to sort items from sensor readings, and different methods for path planning such as RRT.

Computer Simulation:

Analyzing systems of differential equations, discrete models such as cellular automaton. Semester team project on simulating trading and liquidity providing on the Uniswap decentralized crypto exchange.

High Performance Computing:

Wrote efficient parallel algorithms in Julia. Used SSH and Jupyter Notebooks to run code on the Georgia Tech Pace Computing Cluster. Implemented algorithms with shared memory CPU multithreading, CUDA GPU multithreading, and MPI distributed memory computing. Algorithms include Dense/Sparse Matrix Multiplication, FFT, and sorting.

Data Structures and Algorithms

Projects:

Blending Music with an Autoencoder

Presented at Georgia Tech Music, Art, and Technology Fair:

Modified an Autoencoder Neural Network that composed music to smoothly blend two songs. Presented at the Georgia Tech Music Art and Technology Fair in March of 2020. The Autoencoder can write an original song if given a random latent vector. Within the simple latent space, it is possible to take a linear path between any 2 latent vectors that represent songs, and when the network is properly trained, the smooth transition in the latent space translates to a smooth transition in the music regardless of how different the songs are from each other.

Computer Systems Mentorship using C:

Participated in a two year mentorship program working on a collaborative case study utilizing Quake 3, an early networked 3D game written in C and capable of running efficiently on even the slowest of computers. Added several Vector and Quaternion functions to handle rotation, interpolation, and projection. The use of Quaternions enabled 3D swinging motion, allowing the player to swing through the level like spiderman. Created a library for each of the vector and quaternion methods with documentation and tutorials so that any team in future years would be able to utilize these tools.

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Carnegie Mellon: National High School Game Academy:
Attended a 6-week Computer Science course at Carnegie Mellon for game design. Collaborative teams of 5 people were assigned to remake a classic game with a twist, and then make an original idea in VR. Learned how to maintain focus and motivation within the team as the stress of the deadline approached and how to manage code with multiple people. Learned to use Audacity for sound design, photoshop, and Autodesk Maya, while programming the game with the Unity engine in C#.

Other activities:

Facilitated discussion for Effective Altruism AI Safety Seminar Spring 2023
Attended Def Con 27
Eagle Scout
Math Tutor 2016-2021
Scuba Certified
Flute