Anti
github.com/Antimatter543

Email: antiraedus (Message me on discord)
Mobile: nuh uh
antimatter543.github.io

Education

Bachelor of Computer Science, Majoring in Machine Learning — Brisbane, QLD
University of Queensland — *2022-present*

- **Cumulative GPA:** 6.65/7 (Dean's Commendation of Academic Excellence: 2022, 2023)
- **Extracurricular**: General Executive @ UQCS (UQ Computer Science), previous panelist on UQCS' First Year Panel 2024 & involved with event hackathons.

Experience

Casual Academic Tutor — Jan 2024 – Present
School of Electrical Engineering and Computer Science - University of Queensland — *Brisbane, Australia*

- Delivered tutorial content to student classes studying an artificial intelligence (reinforcement learning) Python course (COMP3702) about Markov decision processes (MDPs), search algorithms, neural networks and uncertainty.
- Supported students in developing problem-solving skills related to theoretical computation in COMP2048, focusing on Turing machines, recursive functions, and the Church-Turing thesis.

Projects

CodeClash - UQCS Hackathon | *AWS, Flask, Docker, EC2, Git, SSH, Vite, Javascript* — Aug 2024
Developed a full-stack competitive coding web application as project leader and Flask backend developer, enabling users to submit solutions to programming challenges while sabotaging their opponents' code.

- Deployed Judge0 (arbitrary code execution) on AWS EC2 instance with Docker, optimizing API response times from ˜15 seconds to under 2 seconds (**7x speed improvement**).
- Designed a Flask backend deployed remotely on EC2 to handle program execution and return detailed test results to the frontend via REST API.
- Developed a language parser to handle test case conversions across multiple programming languages for robust solution evaluation.

Soulsync - Mood Tracking App | *React Native, Expo, TypeScript, Supabase (planned), SQLite* — Dec 2024
Designed and developed a minimalistic mobile app for mood and activity journalling, featuring extensive data visualizations.

- Built a React Native frontend with a clean, minimalist interface, using Expo to simplify builds for differing OS'.
- Integrated SQLite for offline storage of mood, activities, and notes, ensuring functionality without internet access.
- Planned integration of Supabase for secure user authentication and synchronized data across devices.

Alzheimer's Disease Detection using Vision Transformers | *Pytorch, Matplotlib, Numpy* — Aug 2024
Developed a machine learning pipeline to classify Alzheimer's Disease from brain MRI images using Vision Transformers, training the model remotely on UQ Rangpur clusters and contributing to the PatternAnalysis library.

- Implemented a modular ViT architecture with features like confidence visualization, hyperparameter tuning, and a prediction script for unseen images.
- Preprocessed MRI datasets with normalization and aggressive augmentation, achieving a test accuracy of 67.93%, and documented results with plots and reports.
- Contributed to the PatternAnalysis GitHub library through regular commits, detailed README documentation, and a professional pull request workflow.

NanoGPT and Neural Networks from scratch | *Python, Numpy, Pytorch, Github* — Feb 2023
Created a character level Generatively Pretrained Transformer (GPT), following the paper "Attention is All You Need" and OpenAI's GPT-2 / GPT-3, which can load real GPT-2 weights. Visualised statistics about neural networks, and created models from classical bigrams to full MLPs and transformers, trained on Shakespeare datasets.

- Constructed an initial bigram model capable of receiving multiple batch dimensions (size B,T,C) for efficiency.
- Implemented decoder-only self-attention heads, enabling effective sequence information communication within the model. Also added blocks of multi-headed self attention, feedforward layers and layernorms to improve model capabilities.
- Visualised statistics about neuron outputs to increase stability of model training and improve accuracy scores by 25%.

Brute-Force Password Cracking System | *C, SSH, Networking, Multi-threading, Unix, TCP/IP* May 2023
Developed a client (`crackclient`) and server (`crackserver`) system for password cracking and encryption, showcasing multi-threading and basic TCP communication in C via terminal, along with CLI tool usage.

- Implemented a brute-force decryption algorithm with word-lookups using multithreading for efficient password cracking, which on average sped up processing times by x10.
- Enabled `crackserver` to manage multiple client connections simultaneously using multithreading and included error handling for network disruptions.
- Designed a modular system architecture and provided comprehensive documentation for each module, ensuring maintainability, ease of debugging, and clear communication of system design.

Dataplanet - UQCS Hackathon | *Node.js, Javascript, GlobeGL, HTML, Git* Aug 2022
Developed a 3D data visualisation project as project leader, allowing users to explore a globe and interact with real-time datasets related to UN sustainability goals.

- Designated project leader, and delegated team priorities, organised deadlines and core priorities for the product goals, which led to a successful and completed project.
- Handled REST API calls to multiple servers and manipulated JSON queries to render poverty and air pollution data in real-time on the browser.
- Used trunk-based development with Git to minimise merge conflicts for pull requests. Read documentation to understand how to manipulate the graphics to desired shape, along with data handling.
- Recognised with multiple awards for innovation and impact:
  - Awarded the **Google Generations Scholar** grant for Dataplanet, including a virtual presentation at the AUS & NZ Generation Google Scholarships event.
  - Winning solution at the **Amazon Sustainability Data Initiative (ASDI) Global Hackathon**, selected from 1500 participants, earning $2000 AWS credits.
  - Received **Best Community Award** at the UQCS Hackathon for addressing social justice problems through innovative technology.

AI Bot - Dungeons and Data Structures | *Python, Docker, Git* May 2021
Developed a bot agent with a team of 4 that utilised techniques such as minimax and value functions to compete against other bots in a bomberman-like game tournament, reaching the game finals. Communicated deadlines and attended meetings for progress checks / pivoting strategies. Wrote a post-event reflection on my blog post here.

- Led the decision-making algorithms approach for the agent (opposed to AI techniques), which was ultimately used in the final version due to a 2 core CPU processing limitation.
- Wrote documentation on program functions and constructed a game wiki to better organise knowledge.

Key Achievements

- **Google Generations Scholar** — Google, Oct 2022
  Awarded a generous grant for creating Dataplanet by the AUS & NZ Generation Google Scholarships event, followed by a virtual presentation showcasing the project.
- **Amazon Sustainability Data Initiative (ASDI) Global Hackathon** — Amazon, Sept 2022
  Winning solution selected from 1500 participants, earning $2000 AWS credits for a project addressing UN sustainability goals.
- **Best Community Award - UQCS Hackathon** — University of Queensland, Aug 2022
  Recognized for addressing social justice problems through innovative technology with the Dataplanet project.