Athena Cai

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Technical Skills

Languages: C++, Python, SQL, R, JavaScript, BASH, HTML, CSS
Frameworks: Selenium, React, Node, Express, MongoDB, MySQL
Other Skills: pandas, numpy, Git, TensorFlow, Object Oriented Design, Data Structures, Algorithms

Education

University of Toronto Sep 2022 – Present
B.Sc., Computer Science and Mathematics *GPA: 3.93/4.00*

Projects

Speech-to-LaTeX Converter with Advanced UX | *Data Structures, JavaScript*

- Created an innovative application that achieves real-time conversion of spoken language into precise LaTeX notation appropriately **integrated** within non-mathematical text.
- Used **nested arrays** to engineer a sophisticated and efficient algorithm with **recursive parsing** for sub-expressions nested in complex mathematical expressions. The algorithm allows users to group mathematical terms to **eliminate ambiguity**, making it **more usable** than existing solutions.
- Implemented distinguishing of mathematical content from non-mathematical input.
- Designed an intuitive user interface that enables efficient editing and term grouping, providing users with a seamless customization experience.

Full Stack Ride Sharing Application | *React, MongoDB, JavaScript, Express, HTML, CSS*

- Developed a website enabling users of Uber ride-hailing to find carpooling options and save 50% on rides utilizing an **MVC** architecture.
- Implemented a **RESTful API** on the back-end using **JavaScript** and **ExpressJS** to support seamless communication between the server and client.
- Designed and developed the front-end of the website with **ReactJS**, ensuring an intuitive and responsive user interface.
- Implemented **CRUD** (Create, Read, Update, Delete) back end and database functionality in **MongoDB** to return relevant search results and manage user profiles and carpooling listings.

Huffman Compression Algorithms | *Python, OOP, Data Structures and Algorithms*

- Data Structures and Algorithms course (CSC148) Assignment: implement lossless file compression and decompression using Huffman algorithms.
- Developed highly efficient algorithms for the creation, **traversal**, and data extraction from Huffman trees, showcasing a deep understanding of complex **tree structures**.
- Designed decompression algorithms that dynamically constructed Huffman trees from **post-order** and other order lists, demonstrating versatility in data manipulation.
- Comprehensively tested the implementation for edge cases and time efficiency, ensuring robustness and optimal performance. Final assignment submission received a mark of **95%**.

New York Subway Traffic Analysis and Optimization | *SQL, MySQL, R, numpy, pandas*

- **Pre-processed** and **analyzed 31 million** rows of New York subway traffic data using **SQL** and **R**.
- Identified peak subway line usage during specific times, both weekly and seasonally.
- Derived data-driven suggestions for subway frequency adjustments to improve the commute experience for **1.2 million** passengers daily by reducing crowding and optimizing resource allocation.
- Currently developing predictive models to further enhance subway service efficiency.

Snake Game Deep Q-Learning | *Python, OOP, Tensorflow, Pygame*

- Trained a deep Q-learning model to play the snake game.
- Implemented the snake game environment using **Python Object Oriented Programming**
- Implemented user-environment interaction and environment display with Pygame API
- Implemented **q-learning** framework and methods for model-environment interactions
- Implemented a dense neural network with **TensorFlow** to train the Q-learning agent