RYAN BUTLER

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SOFTWARE DEVELOPER

I am a motivated computer science major focused on machine learning and utilizing specialized data structures to achieve highly performant code. I have worked extensively with computational modeling and designing specific data structures to handle the interfaces required for efficiently simulating complex systems. Comfortable using matplotlib to visualize large scale datasets. I manage my own project roadmaps and development timelines. I am also experienced at tutoring and collaborating with others to more deeply understand computer science concepts.

EDUCATION

Harvey Mudd College **Expected May 2024**

Bachelor of Science, BS, Computer Science, Minor in Music Performance | GPA 3.632.

Dean's List: Spring 2021 | Fall 2021 | Spring 2022 | Fall 2022 | Spring 2023.

Relevant Coursework: Principles of Computer Science | Data Structures and Program Development | Computing for Insight | Discrete Mathematics | Linear Algebra | Probability and Statistics | Differential Equations | Algorithms Machine Learning (Reinforcement Learning) | Computer Systems.

SKILLS

Programming Languages: C++ | Python | C | Java | Shell | R | Prolog | Racket.

Software and Libraries: Github | LLDB/GDB | Markdown | Matplotlib | Pandas | NumPy | Valgrind | LaTeX | Seaborn.

RESEARCH EXPERIENCE

Harvey Mudd College, Research Intern **June 2022 - Present**

- Furthered multiple Reinforcement Learning (RL) projects in the Mini Atari environment.
- Explored different ways of reusing data to decrease interactions with the environment.
- Optimized a from-scratch decision tree codebase to run 80x faster, allowing for scalable experimentation.

WORK EXPERIENCE

Harvey Mudd College, Grader/Tutor **September 2021 - Present**

- Introduction to CS | Computing for Inquiry | Data Structures | Algorithms.
- Explained course concepts and answered homework questions for hundreds of students.

PERSONAL PROJECTS

Modeled the ranking system of a popular mobile game (C++ | Shell | Python) **March 2023**

- Used an Object-Oriented approach to create an efficient ranking system model.
- Experimentally optimized system parameters to minimize repetitive gameplay.
- Wrote a shell script to automate experiments.
- Visualized multiple trials of data in Python's Matplotlib.
- Documented source code: https://github.com/RyanButler53/PathOfLegends.

Created a model of an Elo-based ranking system (C++ | Python) **January 2022 - August 2022**

- Modeled the system by using a specialized Random BST along with OOP.
- Wrote a script to graph results in Python's Matplotlib.
- Documented source code: https://github.com/RyanButler53/CRLadder2.1.

Implemented C++ class templates of various interesting and unusual data structures **Ongoing since May 2023**

- Splay Tree: Implements map interface with no extra overhead in nodes and offers an iterator.
- Cuckoo-HashMap/HashSet: Implements set and map interface with constant time worst case lookup.
- Interval Tree: Allows for efficient querying of intervals that intersect a given point.
- Quack: Implements the queue interface 10-20x faster than the std::queue library.
- Minqueue: Implements the queue interface plus constant time minimum lookup.
- Skip List (Ongoing): Working on a probabilistic alternative to a self-balancing binary search tree