Garrett M. Fereday

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Experience

Artificial Intelligence Research Assistant December 2021 - Present
Hansen Lab - Dept. of Computer Science, Mississippi State University Starkville, MS

- Invented, and implemented in C++, a priority queue data structure that augments an existing two-level bucket queue to improve the asymptotic complexity of the A* algorithm
- Devised, and programmed in C++, a novel priority queue data structure for bounded-suboptimal and anytime search algorithms related to A*, which has improved asymptotic complexity compared to a binary heap, while also providing tighter suboptimality bounds
- Created a hybrid algorithmic strategy that exponentially improves the worst-case number of node re-expansions that may be performed by bounded-suboptimal and anytime search algorithms related to A*, while further improving suboptimality bounds
- Researched techniques to accelerate linear programs to improve algorithms for finding the frame of a convex hull, and analyzed the relationship between these algorithms and those used for pruning vectors in value iteration for Partially Observable Markov Decision Processes (POMDPs)
- Developed and evaluated the efficacy of a C++ implementation of heuristic AND/OR search for generating finite state controllers to represent POMDP policies
- Derived a statistical approach to sorting numerical data that outperforms both introspection sort and tim sort, implemented in C++
- Assisted in teaching Introduction to Algorithms, aiding students in understanding asymptotic analysis and various algorithmic strategies such as decrease-and-conquer, divide-and-conquer, dynamic programming, backtracking, and branch-and-bound

Research Assistant May 2018 - December 2021
Center for Advanced Vehicular Systems Starkville, MS

- Researched coordination techniques for multi-agent swarms of autonomous vehicular systems in conjunction with the Army's Engineering Research and Development Corps (ERDC)
- Programmed a C#/WPF application for the integration of simulation management, execution, and asset creation
- Developed a C#/WPF application for manipulating and exporting data from the Autonomous Navigation Virtual Environment Laboratory (ANVEL) into a custom internal format, ensuring cohesion across multiple simulation systems

Software Engineering Co-op August 2015 - August 2017
Triton Systems of Delaware, LLC Long Beach, MS

- Designed and developed a C#/WinForms application for performing diffs on custom software package files to assist quality assurance and deployment work flows
- Extended and maintained a C#/WinForms application for simulating ATM card readers and PIN pads from various vendors, enabling long-term automated testing of ATM systems
- Oversaw continuous, automated stress testing of ATM systems to evaluate the expected transaction lifetime of the onboard NAND-Flash memory

Education

Mississippi State University Starkville, MS
Doctor of Philosophy, Computer Science May 2025

Mississippi State University Starkville, MS
Bachelor of Science, Computer Science; *Summa Cum Laude* May 2019

Technical Skills

Languages: C/C++, C#, Python, Java, JavaScript, SQL, PHP, CMake, Make, Verilog
Tools and Environments: Visual Studio, VS Code, Git, Virtual Box, Unity, Windows, Linux
Frameworks/Libraries: IBM ILOG CPLEX, Windows Presentation Foundation (WPF), WinForms, Bootstrap
Techniques: Monte-Carlo Path Tracing, Multiple Importance Sampling, Spatio-Temporal Variance Guided Filtering, Heuristic Search, Constraint Satisfaction, Linear Programming