

CS350 Algorithms And Complexity Term Project Proposal

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1. Topic: Convex Hull Problem (Brute Force vs. Quickhull Algorithms)

Since Convex Hull problems are modeling a physical system it should be really interesting and educational to create visualizations of exactly how the two algorithms work. Also we've spent a lot of time in class learning about sorting algorithms and data structures were well covered earlier in our academic careers.

2. Language: Java

Java as a language for implementing the algorithms seems natural since both of us have development environments and are familiar with it. Also there are tons of libraries and resources for automated testing as well as visualization.

3. Features:

- (a) Description of both algorithms, along with worked examples for very small n .
- (b) Source code for implementation of algorithms.
- (c) Description of automated testing.
 - i. Check for correctness of algorithms against known implementations.
 - ii. Generation of input data.
 - iii. Time efficiency for varied values of n
- (d) Analysis of complexity.
 - i. Exploration of cases where brute force may be faster than quick hull.
- (e) Results.
 - i. Expected vs. actual results.
 - ii. Explanation of any discrepancies.
- (f) Implementation challenges along with what we learned.

4. Time Plan

Week	1	2	3
Goal 1	Implement Brute Force	Implement QuickHull	Run tests and record results
Goal 2	Describe Brute Force	Describe QuickHull	Analyze results
Goal 3	Research test input data	Complete Testing Framework	Final project rough draft
Goal 4	Implement input data generator	Analysis of both algorithms	Final draft

5. Collaboration Plan

- (a) Weekly meetings Tuesdays after class to pair program.
- (b) Coordination of source code and report text via public github repository.
- (c) Work independently and teleconference meetings as necessary.