

COMS W4995 Fall 2022
Parallel Functional Programming
Proposal: **Fleet** - Parallelizing Convex Hull

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1 Definition

In this project, we will implement sequential and parallel versions of various convex hull algorithms, and analyze their performance and how that performance changes under parallelization.

The convex hull of a set of points is the smallest convex polygon that contains all the points. It's a fundamental geometric structure, and is used in many disciplines, such as in computational geometry, computer vision, and machine learning. More specifically, the convex hull is also used in the construction of Delaunay triangulations, Voronoi diagrams, and other geometric structures.

We will write a program that generates random points to automate test generation. We will then compare the performance of the sequential and parallel versions of our algorithms.

2 Algorithms

The algorithms we plan to implement are the following:

- Jarvis March
- Quickhull
- Graham Scan
- Monotone Chain
- Chan's Algorithm

If we run into time limitations, we will favor a robust implementation of a few algorithms over a less robust implementation of many algorithms.