

## Convex Hull Challenge for VISR-VR

In this challenge I was tasked with writing a program capable of solving a convex hull problem consisting of 16 points. I chose to solve it using Rust<sup>1</sup> as that is the language I am currently focusing on to try to learn more thoroughly and I saw this as an opportunity to further my ability in an organic way.

In my preliminary research for this project I learned that there are several existing algorithms<sup>2</sup> for this purpose. Due to the time constraints of having both exams and a part time job, my research led me to settle on Graham Scan<sup>3</sup> as my algorithm of choice since it seems to be one of the more efficient algorithms; which while for this dataset is unnecessary here, it would become important if this program were to be run against a larger dataset. It is also worth noting that this algorithm cannot be used with 3d data.

Another choice I had to make was which sorting algorithm to use when sorting points by polar angle. The way in which I have done this was not as efficient as I would have liked. To make this more efficient I could have cached the result of ``angle_with`` in a lazy way so it would only be called once, and only when the value was required. I would also use a different sorting algorithm.

In this project I have made the decision to not use any third party libraries, with the exception of `rand`<sup>4</sup> which was used to generate random points. It would not have been feasible for me to attempt to implement this myself.

Whilst I am happy with my implementation for the purpose of this challenge, it is clear there are many things I would do differently if I had more time or fewer commitments.

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<sup>1</sup> <https://www.rust-lang.org/en-US/>

<sup>2</sup> <http://www.cs.wustl.edu/~pless/506/l3.html>

<sup>3</sup> <http://www.inf.ed.ac.uk/teaching/courses/ads/Lectures/lec16.pdf>

<sup>4</sup> <https://crates.io/crates/rand>