



CSI 2120 Programming Paradigms - Project 2

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Meet Mehta

Student ID: 300261159

Overview

In this experiment, we explore the relationship between the number of threads and the runtime of RANSAC algorithm. We aim to find the optimal number of threads to create in order to minimize the runtime of the algorithm. To do this, we measure the runtime for different configurations of threads and plot the results.

Algorithm

The algorithm used in this experiment is a plane fitting algorithm that takes a plane and a slice of 3D points as input, and returns the slice of points that are closest to the plane within a given tolerance (eps: value entered by the user). The algorithm uses the RANSAC algorithm to fit a plane to the input points, and the number of iterations used by RANSAC is proportional to the number of threads used.

Experimental Design

To determine the optimal number of threads to create, we run the algorithm for different numbers of threads, from 1 to 12. For each configuration, we measure the runtime of the algorithm and record the results. We repeat the experiment multiple times to ensure the results are consistent.

Result Analysis

We plot the results of the experiment on a graph showing the runtime versus the number of threads for each configuration.

Raw Data:

Threads	Run Time
1	7.944042
2	3.942458
3	2.774459
4	2.084583
5	2.137375
6	1.816958
7	1.614958
8	1.929958
9	1.776458
10	1.766166
11	1.532416
12	1.385291
13	1.664041
14	1.666708
15	2.337375
16	1.462208

Graph showing Threads VS Run Time

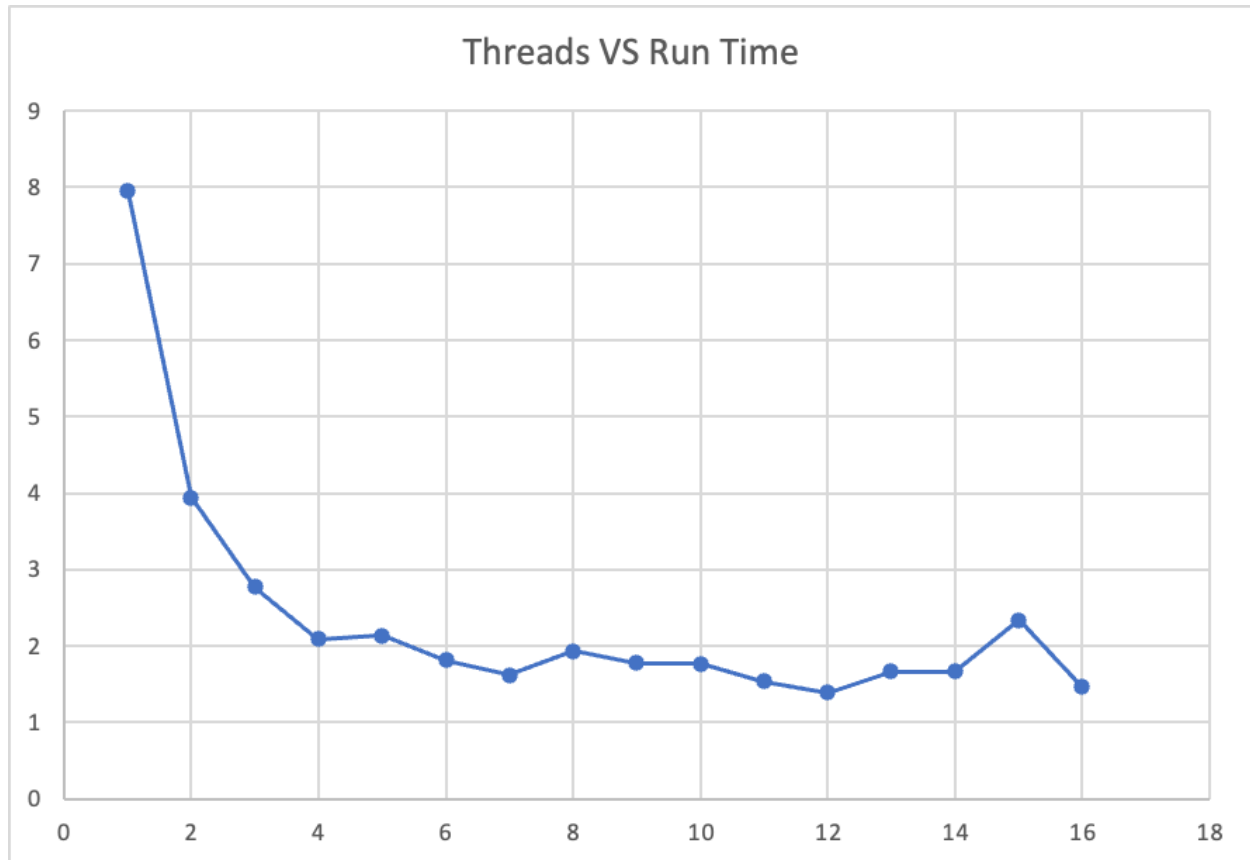


Figure 1: Graph showing the number of threads VS Run Time for each thread

Discussion

The results of the experiment show that the runtime of the plane fitting algorithm decreases as the number of threads increases, up to the point where the number of threads are 12 after which it further increases or has diminishing returns. The graph shows that the optimal number of threads for this algorithm is between 11 and 12, where the runtime is minimized. Beyond the 12th thread, the performance gains are minimal if there are any.

Conclusion

In conclusion, we have found that the optimal number of threads to create for the plane fitting algorithm used in this experiment is 12 Threads. This finding can be used to optimize the runtime of this algorithm for larger datasets by using the optimal number of threads.