Assignment 9 Analysis

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**Construction**

**What is the "worst case" order to insert them? Plot the runtimes of the 2 methods for building the tree. Do your experiments match the Big O growth rates you expected?**

The worst case could be that segments are sorted by their x-coordinate in ascending order. Each new segment could potentially split all the segments that have been inserted before it.

As shown by the figure, the log-log scale plot provided illustrates the relationship between the size of segments and the average time taken to construct a BSP tree using both bulk construction (blue curve) and sequential insertion (orange curve) methods. In a log-log scale plot, a linear relationship indicates a power-law correlation between the two variables. The steepness of the orange curve is consistent with the O(N2) complexity often associated with the sequential insertion method in worst-case scenarios. The shallower slope of the bulk construction suggests an algorithmic complexity better than O(N2), potentially close to O(NlogN), which is typically desired for a BSP tree construction. Thus, the results match theoretical expectations: bulk construction should generally perform better than sequential insertion in A graph with a line and a blue line

Description automatically generatedthe worst-case scenario due to its ability to maintain a more balanced tree.

**Collision Detection**

**Does our optimized collision detection routine run in the big O you expected? Be sure to describe the details of your experiment.**

Yes, the routine behaves as expected.

A graph with orange and blue dots

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A graph with a line

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