Project Phase II

Axis Parallel Line Segment Intersection Problem

Due Date: 12/09/2015

1 Description

The Phase I is designed to get you all ready with your algorithm for the *Axis Parallel Line Segment Intersection* problem. The main goal of the Phase II is to implement the designed algorithm and compare it with a brute force algorithm. Also, it is important to understand and analyze how the running time of the algorithm varies as we increase the number of line segments. The description of the tasks to be performed in phase II are as follows:

- Implement a brute force algorithm for the Axis Parallel Line Segment Intersection Problem
- Implement the algorithm you proposed in the Phase I for the problem.
- Implement a generator of test cases for the algorithm.[The idea and specifications related to this are given in the next section].
- Plot a graph with the number of line segments n on X-axis and the running times T_n, T_b on the Y-axis, where T_n, T_b are the running times of your algorithm's implementation and the brute force algorithm's implementation respectively. The run time of the algorithms should be plotted for n values in $\{10, 100, 500, 1000, 2000, 10000, 20000\}$.

2 Random Line segments Generation

One important task in this phase is to to generate line segments. The maximum X-coordinate and Y-coordinate of any line segment should be less than or equal to $1,000,000$. To create a horizontal line segment, one should randomly generate the X-coordinate of its left endpoint. To create a vertical line segment, one should randomly generate the Y-coordinate of its bottom endpoint. Each line-segment will be of length 25. This idea might often lead to generation of line segments that overlap. For example, we could get two horizontal line segments with the following end points, $\{(25, 40), (50, 40)\}$ and $\{(40, 40), (65, 40)\}$.

In this case, if a vertical line segment intersects both the horizontal line segments in the overlap region, your algorithm should be able to record both the intersections. So make sure to modify your earlier algorithm for the *Axis Parallel Line Intersection* problem to record all the intersections even in the presence of overlapping line segments.

3 Final Notes

Please post any of your questions regarding the Phase II description and expectations on Piazza. The Professor or the TAs will respond to your queries as soon as possible. The evaluation will be based on your effort in performing each of the tasks mentioned in Section I. Please make sure not to share your codes. Any such findings will be penalized.