

Assignment-1

CS F364

Design and Analysis of Algorithms

Weightage: 10% Total Marks= 30 Submission Date: 6th March 2022 midnight.

Objective: Consider a set of line segments given to you. You want to compute all the intersection points of these line segments and report them. This problem is a well-known geometric problem having implications in many applications.

An efficient solution to this problem was given by Bentley and Ottmann in 1979. You can avail the original paper at

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1675432&tag=1>

You can access this paper through the OPAC system of our library.

A very good explanation of this paper is given in the Chapter 2 of the book “Computational Geometry: Algorithm and Applications” written by Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars.

The scanned copy of the relevant pages describing the algorithm in details are posted. Please refrain from sharing it or posting it in public.

Task 1: You will implement the desired two data structures namely the event queue and the status data structure. Both of these data structures are implemented using Balanced Binary Search Tree.

Task 2: Implement the remaining algorithm. Make sure it is completely coded from scratch by the team members.

Task 3: Test your code on many data sets with different kinds of line arrangement. Report the outputs and timing analysis of your implementation in practice. Develop HTML pages for this report.

Task 4: Use Doxygen to generate the documentation of your code automatically. Learn the commenting rules required for Doxygen.

Pay attention to the way you design your code. Use Object Oriented Language C++ for this assignment. You are not supposed to use any kind of library functions or STL classes. Refrain from using codes available on the internet.

Marking will be based on

- Code Design. [5 Marks]
- Correctness of Implementation of the data structures and the actual algorithm. [10 Marks]
- Indentation and Comments. [3 Marks]
- Presentation skills in the Report (HTML pages). [10 Marks]
- Generation of code documentation using Doxygen. [2 Marks]