

Homework Project 3

Given 11/16/2011, Due 12/13/2011

The aim of this project is to create a program that takes a set of line segments as input, and finds the longest x-monotone path on them. Here x-monotone means that the path always goes to the right, never turns back, equivalently that each vertical line intersects it in at most one point. It provides a visual feedback by drawing the segments and the path on the screen using the `xlib` interface.

The program takes one command-line argument, a file name. The first line of this file describes the coordinate intervals (use this, or a multiple of it, as initial window size).

`[-100,500]x[0,300]`

After that come line segments described by start and end point, with format

`S (20,100) (55,63)`

There are less than 1000 segments.

As first stage, you read the input. Then you compute all the intersection points for the segments; for each segment, the intersection points are sorted left-to-right, and for all intersection and start/end-points you sort the mleft to right. Then you make a sweep from left to right over the arrangement, and maintain for each point the length of the longest path that ends in that point. For each start point of a segment, this is 0; for an intersection point, it is the larger of the values along the two incoming edges, for an end point, it is the value along the incoming edge. This is a dynamic-programming type algorithm.

The programming language is C or C++; test your code before submission using the `gcc` or `g++` compiler. Please remove all dead code; try to program as clearly as possible, since I try to read it. Do not copy code from another student.

Submit your source code by e-mail to peter@cs.ccny.cuny.edu; include your name and the homework number in the subject line.