Homework Project 2

Given 10/08/2014, Due 10/29/2014

The aim of this project is to create a program that takes a set of axis-aligned rectangle obstacles, and the start and final position of a disc-shaped robot, and finds a path that moves the robot from start to target. The obstacles and the movement of the robot are shown on the screen using the `xlib` interface; the robots motion is shown by showing his position after suitable discrete timesteps.

The program takes one command-line argument, a file name. The following lines give the set of rectangular obstacles in the format

```
R (20,100) (55,160)
```

The coordinates are integers; they are the coordinates of the lower left and upper right endpoint. There are less than 100 obstacles. The path must be inside a 700 by 700 square.

As first stage, your read the input, and display the obstacles in a window. Then you get two left mouseclicks which specify the initial stage of the disc (center and radius), and a third mouseclick which gives the final position (the center). You compute and display the motion that moves the initial to the final stage.

The configuration space of the robot are the centerpoints for which the disc is completely inside the 700 by 700 square; to find the path, we subdivide this region (like a quadtree). A square of the configuration space is red if each disc with a center in that square intersects some obstacle; it is green if no disc with a center in that square intersects some obstacle; it is yellow if it is neither green nor red. Only yellow discs need to be subdivided. We stop the subdivision if we found a green path from the start position to the target position, or if all yellow squares have a sidelength less than five.

You display your final subdivision together with the path and the obstacles.

Submit your source code by e-mail to `peter@cs.ccny.cuny.edu`; include your name and the homework number in the subject line, as well as in a comment in the homework file. If you submit multiple files, you can pack them with the `tar` archiver.