

Programming Assignment 6

*Arindam Karmakar***0.1 Write C/C++/Python code for the following problems:**

Indian Army has identified some strategic locations in a forest. The army wants to secure this area by building a boundary wall around the area such that all the strategic points are enclosed within the walls. Army is allowed to build only vertical or horizontal walls. The cost of building the whole boundary is proportional to the area enclosure; To minimize the cost, the area has to be minimized. x -axis will be the left boundary and the y -axis will be the bottom boundary.

The movements inside the walls are also restricted, you are allowed to move in horizontal or vertical direction only. And you cannot leave the restricted area. You have to build the enclosure in such a way that the shortest path between every pair of points will not cross the boundary. See the example in the next figure which is the wrong output for the same input as in the first figure. The output is incorrect because the shortest path between a and c crosses the boundary. Design a $O(n \log n)$ time divide and conquer algorithm to construct an minimum area enclosure P such that the shortest paths are always inside the enclosure.

As shown in the following figure, you can assume that black dots are the strategic points in the 1st quadrant of the 2d plane; that means, all the points have positive x and y coordinates. The output will be the green polygon which is smallest perimeter polygon that can enclose all the points. You have to output the points on the boundary in clockwise order. For example, in the figure below the output will be $(l, p_1, p_2, p_3, p_4, p_5, r, O)$. The figure in the next page is NOT the correct output.



