Design and Analysis of Algorithms (CSC311) – Spring 2017
Instructor: Prof. Mohamed Menai

Term Project Due: Sun. May 7, 2017.
At most two students can jointly work in one project.

1 Introduction

The *convex hull* (a.k.a. *convex envelope*) of a set X of points in the Euclidian space is the smallest convex set that includes X. Figure 1 shows an example of the convex hull of a set of points.

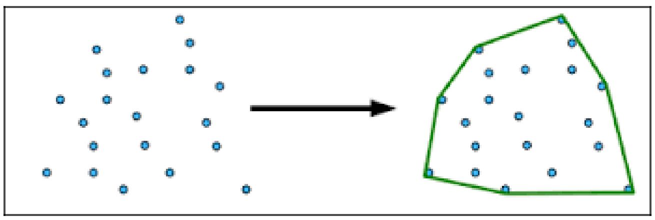

Figure 1: Example of a convex hull

Your task is to implement the Quickhull algorithm (recall Divide-and-Conquer lecture slides 61 & 62). The input of the program is a set of n points (x_i, y_i) in the Euclidian plane. The input points are not supposed to be sorted by their x-coordinate values. You have to work out the details. The output of the program must be graphically displayed at each recursion level until the final result. This means that, in addition to displaying the input points, the program must display at each recursion level:

- The extreme points P_1 and P_2.
- The details of computing the *upper hull* (displaying the intermediate points P_{max}).
- The details of computing the *lower hull* (similarly).

2 What to submit

- A report with a cover sheet with your name(s) and a signed pledge indicating that the project write-up and the coding are your own.
- Write-up of the project (a brief description of your implementation, i.e. what kind of ADT used; cost analysis; sample runs and the conclusion).

- For a sample run, execute your program on the points shown by Figure2.

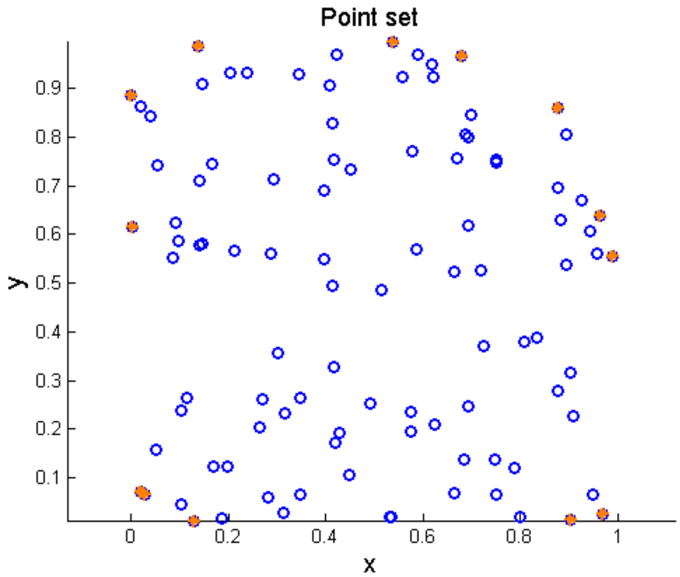

Figure 2: Input points for a sample run

- CD with the source list of the code and the executable.

3 Important note

- Oral presentations and demos will be scheduled after May 7, 2017.
- You may consult books and/or the web for ideas only and it must be duly acknowledged. Contact with other fellow humans is not allowed. The project write-up and the coding must be your own.