Quick Hull

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Algorithm Design and Analysis

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1 What is a Convex Hull?

2 Algorithms for finding the convex hull?

3 Quick Hull

Algorithm 1 QuickHull (S)

▷

▷ Find convex hull from the set S of n points, where $n \geq 3$
▷ Input: A set S of n points
▷ Output: The set H of the points that make up the convex hull

$H := \{\}$ ▷ The convex hull
Find left and right most points, A and B to convex hull
The segment AB divides the remaining $n-2$ points into two groups S_1 and S_2 where S_1 are points in S that are on the right size of the segment AB
FindHull(S_1, A, B)
FindHull(S_2, B, A)

function FindHull(S_k, P, Q)
▷ Find points in convex hull from the set S_k of points
▷ that are on the right side of the segment PQ

    if S_k has no points **then**
        return
    end if
    From the set of points S_k find the farthest point C from the segment PQ.
    Add point C to H at the location between P and Q
    The three points P, Q and C partition the remaining points of S_k into 3 subsets: S_0, S_1 and S_2, where:
    S_0 are points inside the triangle PCQ, S_1 are points on the right side of the segment PC, and S_2 are points on the right side of the segment CQ
    FindHull(S_1, P, C)
    FindHull(S_2, C, Q)
end function