

Pseudo Code

Slow Convex Hull

Input: a set P of points in the plane.

Output: A list containing the vertices of CH(P) in clockwise order.

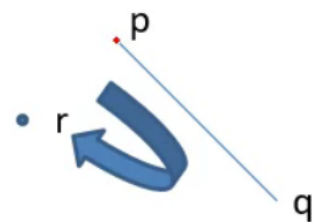
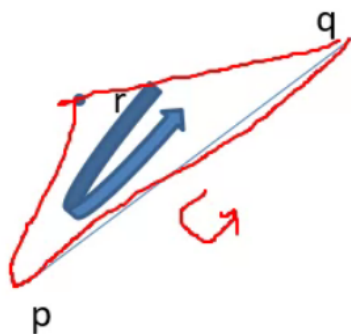
- $E \leftarrow \phi$
 - For all ordered pairs (p,q) in $P \times P$ with p not equal to q
 - Do valid \leftarrow true
 - For all points $r \in P$ not equal to p or q
 - Do if r lies to the left of the directed line from p to q
 - Then valid \leftarrow false
 - If valid then add the directed edge pq to E
 - From the set E of edges construct a list L of vertices CH(P) sorted in clockwise order.
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Condition in line 5

We can use signed area of ΔPQR

Note: for point comparison (if point is left of line) do not use floating point ops and comparison, since it can be inaccurate.

- The answer is : Signed area of the Δpqr .



$$\text{Area of } \Delta = \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

Use sign of above to find if to the left or right.

The determinant test is the most robust test of the above.

If point r does now lie to the right or the left of the line pq , the case is called a degenerate case.

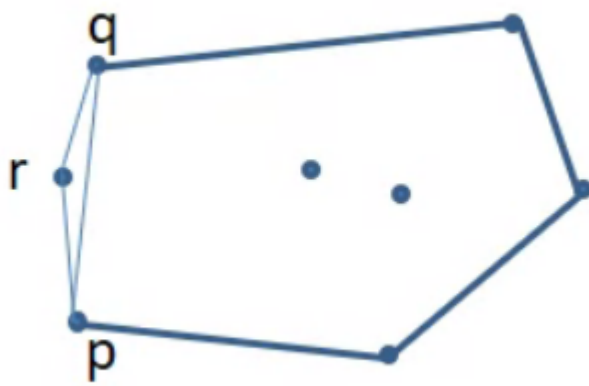
We ignore the case since the points are in general position.

General Position: Points are in general position means that no 3 or more points are collinear.

A directed edge pq is an edge of Convex Hull if P iff all the other points of P lie either strictly to the right of the directed line pq , or they lie on the open line segment pq .

Robustness issue

Area of Δpqr



Graham's Scan Algorithm

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