

Computational Geometry : Lecture 10

Topic : Convex hull algorithms
- continued

Merge hull

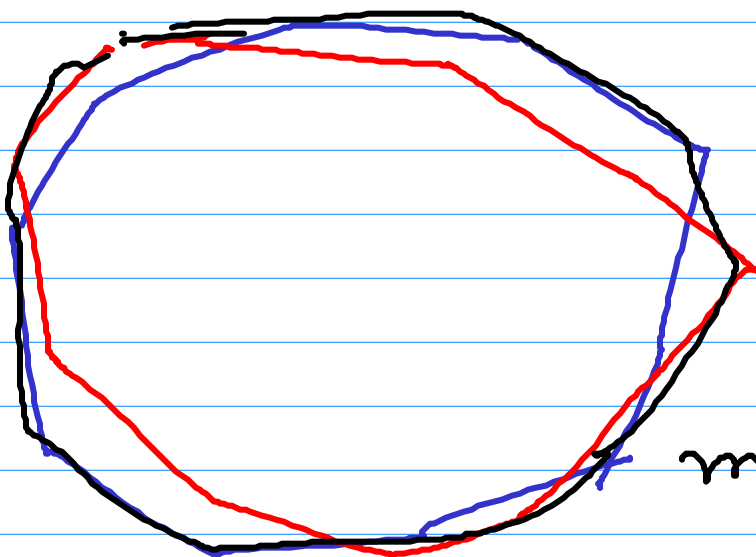
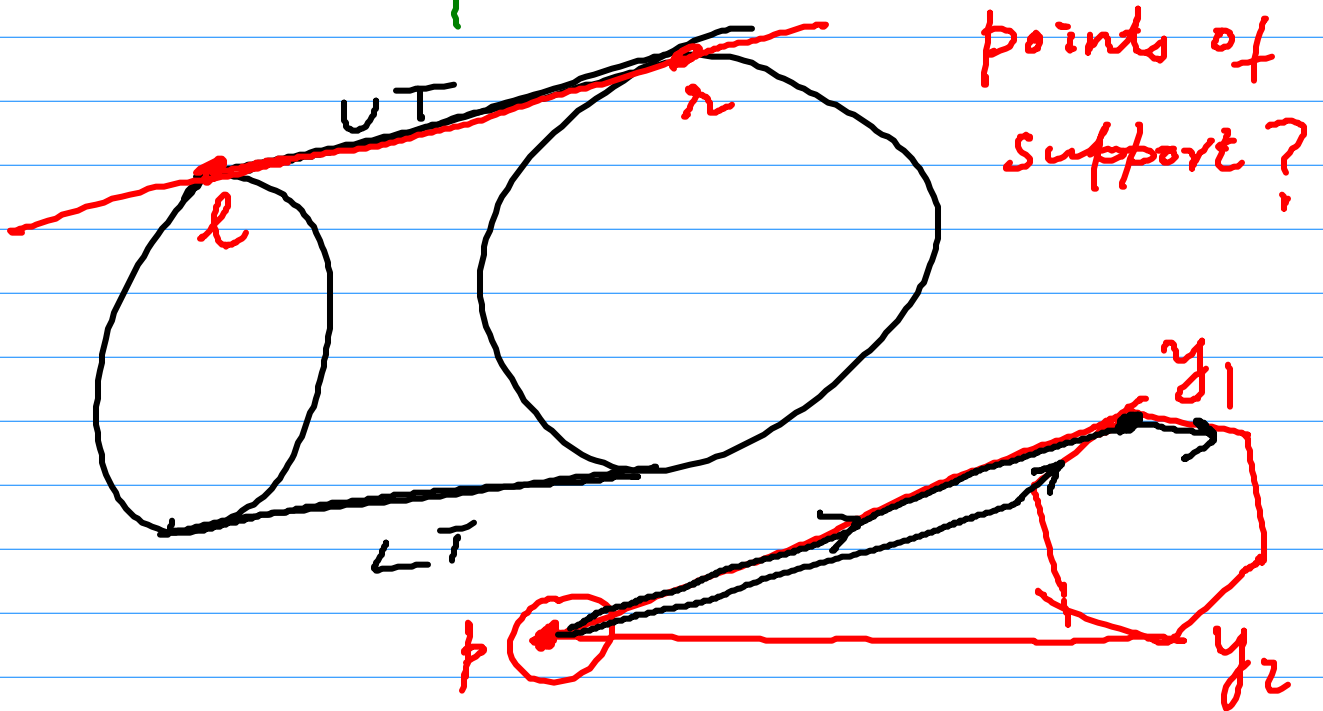
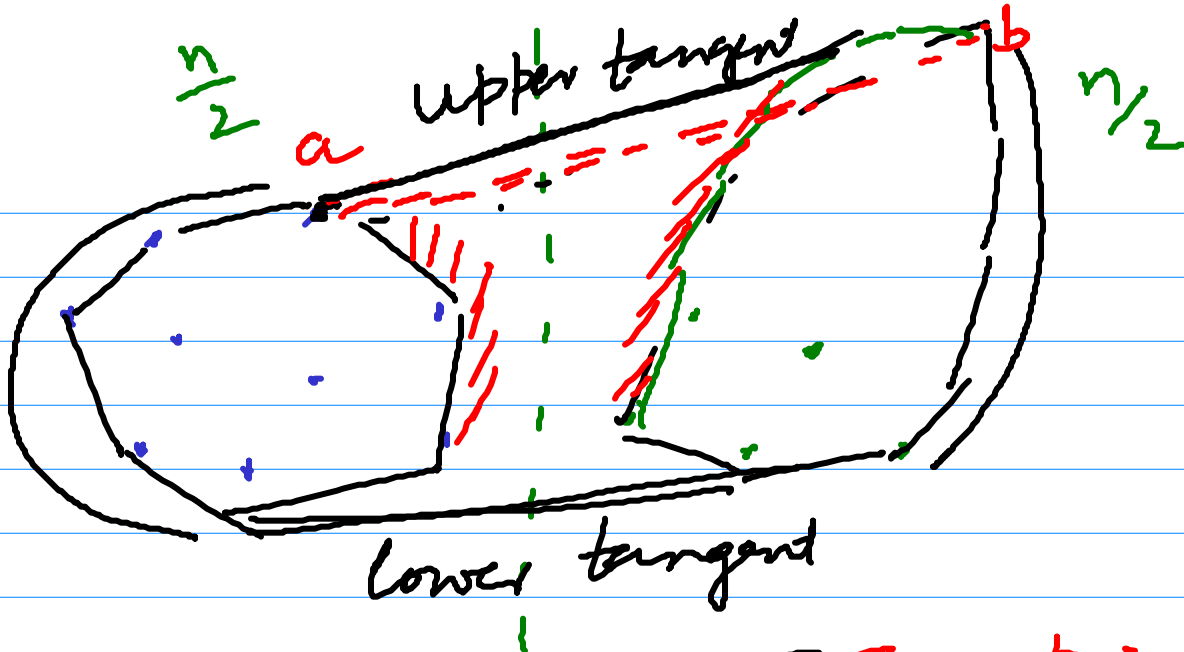
1. Partition the given set, S of n points into two (almost equal) halves, say S_1 and S_2
2. Recursively compute the convex hulls $CH(S_1)$ and $CH(S_2)$
3. Combine or Merge $CH(S_1)$ and $CH(S_2)$ into $CH(S)$.

$$T(n) = 2T\left(\frac{n}{2}\right) + \overbrace{O(n) + O(\log n)}^{O(n)}$$

↑
median division

↑
common tangent

$$\Rightarrow T(n) = O(n \log n)$$



H.W. Exercise
 Use Graham
 scan
 somehow to
 merge in $O(n)$ -time

Insertion Hull

Start with any 3 points that define a \triangle

Insert - the next point until we have exhausted all n points

If - the next point falls within
- the C^i (convex hull of first i points)
then \square
else construct C^{i+1} by finding
- the two tangents

To maintain an ordered sequence, we can use a Binary search tree (balanced).

\Rightarrow All operations can be done

$O(\log n)$ time per point

1. Deletion of points (because of addition)
2. Find the tangents