Lec 9/12

Tuesday, September 12, 2017 12:41

upper bridge & lower bridge start in middle.

Data structure for CH.

Circular Doubly-linked list.

Suppose we have 3 pts:

$P_i = (x_i, y_i)$

(p_1, p_2, p_3) in CCW order iff

$$\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} > 0$$

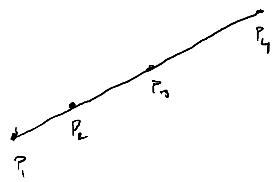
CW if < 0, collinear if $= 0$.

if we have

initial guess for upper/lower bridge.

just add a case for if line is vertical.

or avoid dividing along this line.



B convex hull is just $\overline{P_1 P_4}$

Dynamic Programming

Optimization problem

: solution satisfies condition & minimizes objective function.
or maximizes

Problems & Subproblems:

$P(i,j)$ denotes problem of finding closest pair in $A_{ij} = \{P_i, \ldots, P_j\}$
where $1 \le i \le j \le n$

original problem is $P(1,n)$

$$A = \left\{ P(i,j) \; : \; 1 \le i \le j \le n \right\}$$ is one class of problems.

we could also let $P(i)$ denote finding closest pair in $\{P_1, \ldots, P_i\}$

$$B = \{ P(i) : 1 \le i \le n \}$$

$$B \subset A$$

Problem: construct optimal solution $(x_1, \dots, x_n)$

options for x_1: $op_1, op_2, \dots, op_d$

each option leads to a subproblem P_j:

given $x_1 = op_j$, find optimal solution $(op_j, x_{2j}, \dots, x_{nj})$

The best of these $\overset{d}{\vee}$ optimal $\overset{sub}{\vee}$ solns is optimal soln

DP only works if P_j is a problem similar to the original problem.

Now have an exponential tree of problems.

if many problems are the same and have few parameters, exponential tree is reduced to polynomial.

w/ DAC subproblems are disjoint.