Voronoi Diagram

Incremental Construction

- Complexity

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Point Location

- It costs $O(n)$ time

  to locate p in the current diagram (whose size is $O(n)$)

- To do this, for example,

  we can compute the minimum distance of p to all sites ...

- Actually, for multiple point location queries on a same VD,

  it is possible to answer each query in $O(\log n)$ time,

  after an $O(n \log n)$-time preprocessing //TBDL

- However, the diagram here will be updated right after each query

- Hence preprocessing doesn't help here

Update

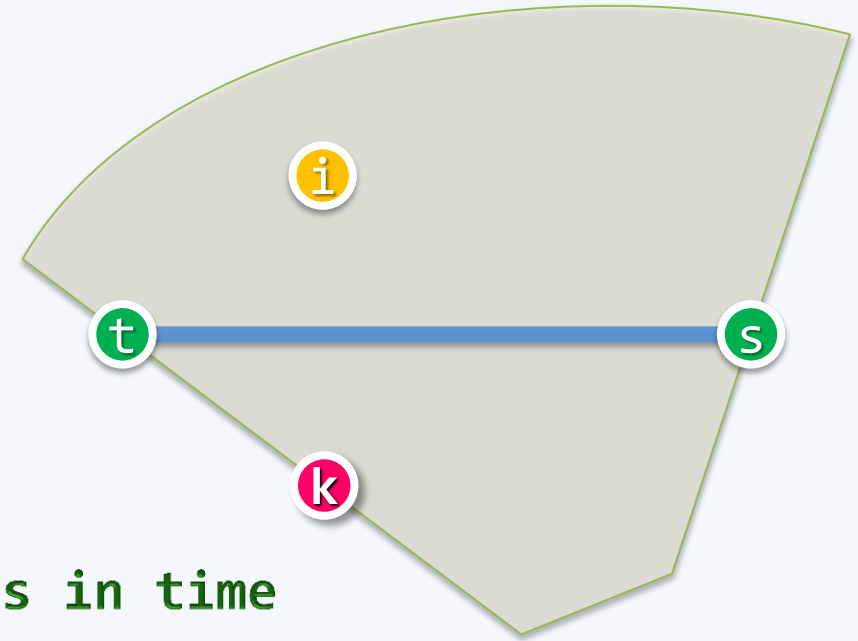
❖ Intersecting the bisector with each cell costs $\mathcal{O}(\log n)$ time

//note that each cell is a convex polygon

❖ Each new cell intersects $\mathcal{O}(n)$ old ones

//The upper bound is reached when, say,

//all old sites are EPs of CH(S_{k-1})

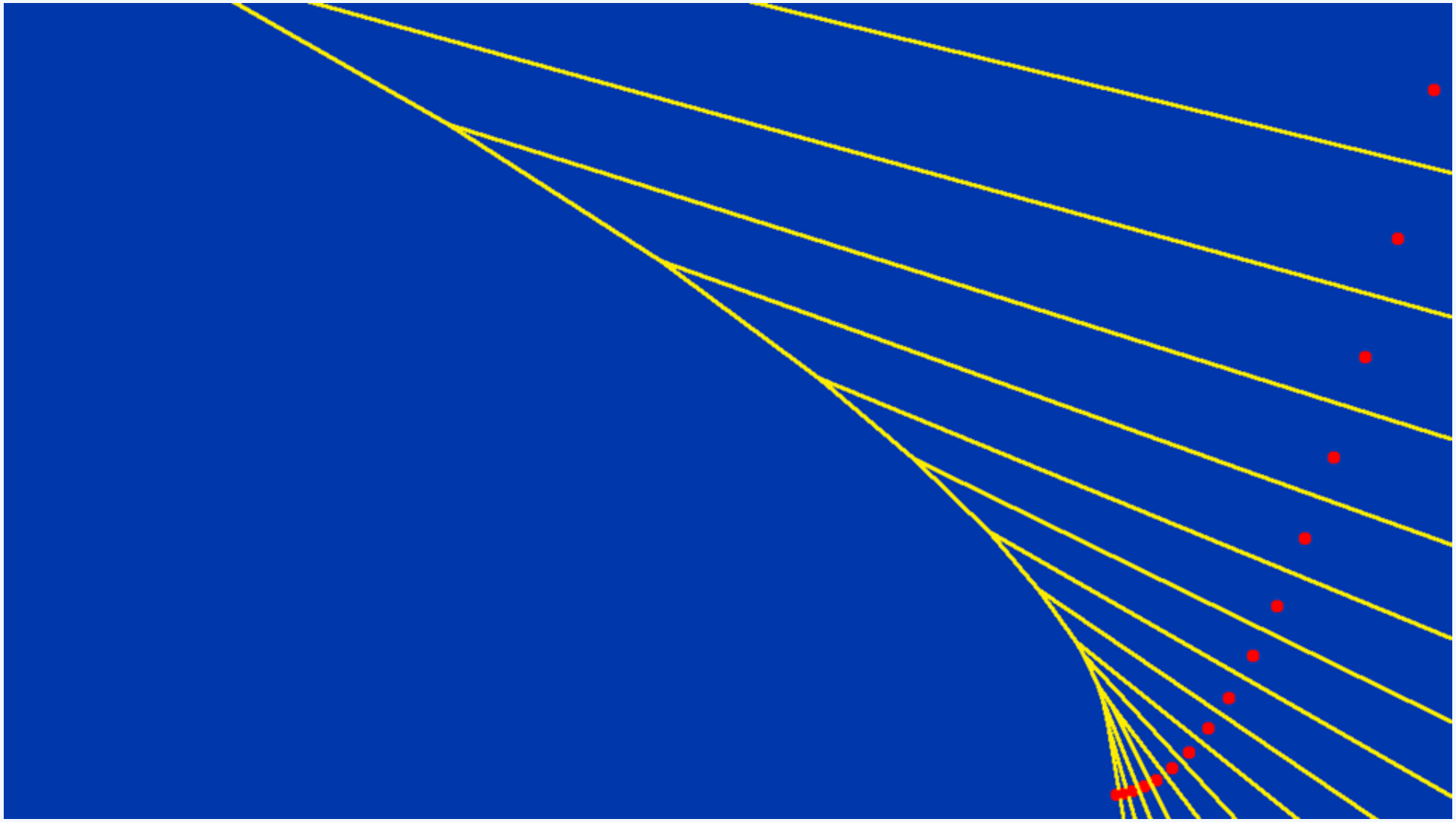


❖ As conclusion, the incremental algorithm runs in time

$$n \times \mathcal{O}(n + n \times \log n) = \mathcal{O}(n^2 \log n)$$

//Can you give an input site set which achieves this upper bound?

Worst Case?!



Worst Case?!