Computational Geometry Lecture 21

Topic: Randomized Incremental Construction (RIC) - contd.

Quicksort:

We visualised the choice of pivots as RIC

→ Main tool: Backward analysis

Useful to analyse the probability that an arbitrary element is involved in the partition involving the i^{th} pivot.

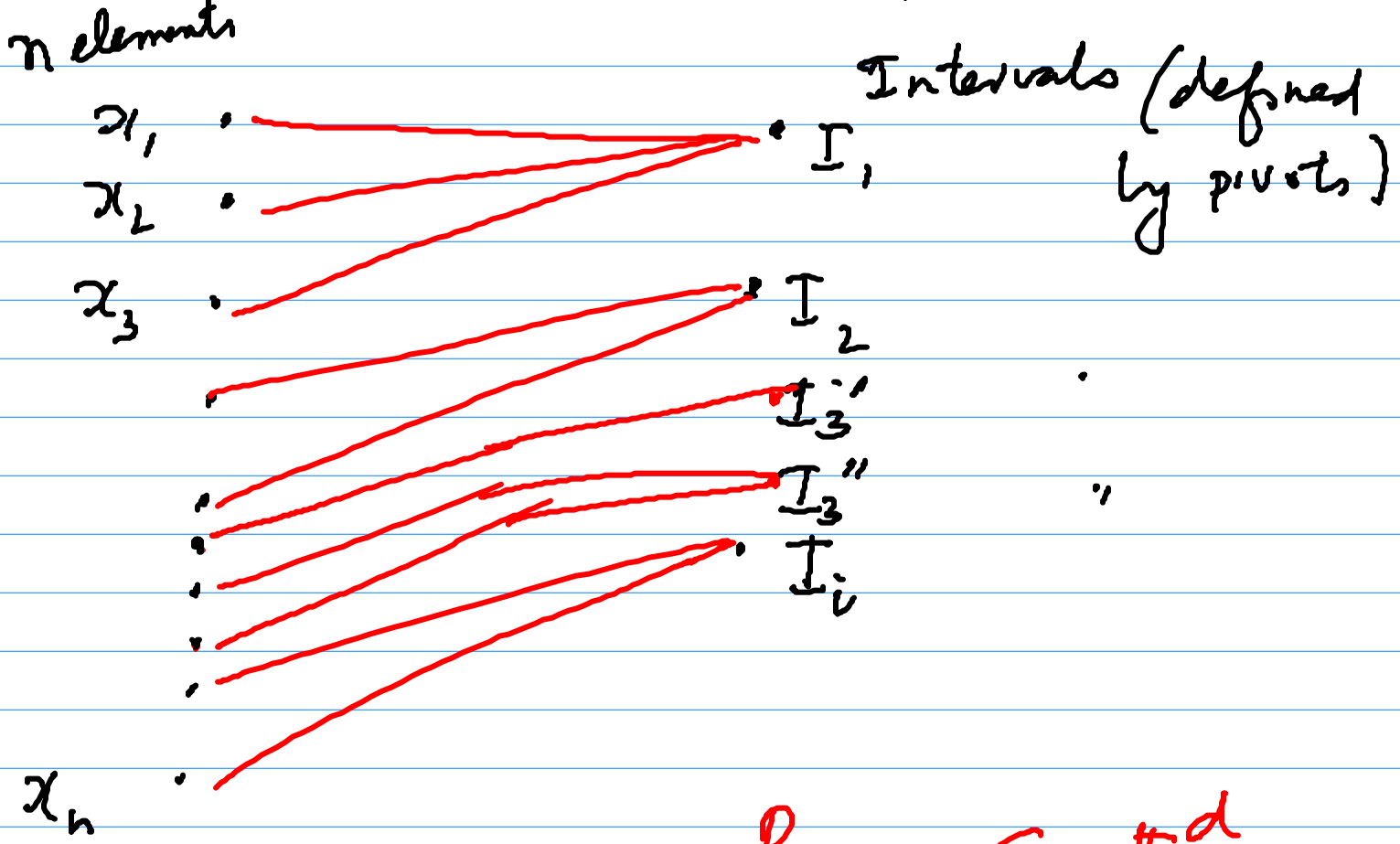
$$\sim \frac{2}{i}$$

Total cost of Quicksort per element

$$= \sum_{i} \frac{2}{i} \sim O(\log n) \text{ (Expected)}$$

$\Rightarrow O(n \log n)$ expected for all elements.

When the i^{th} pivot is chosen



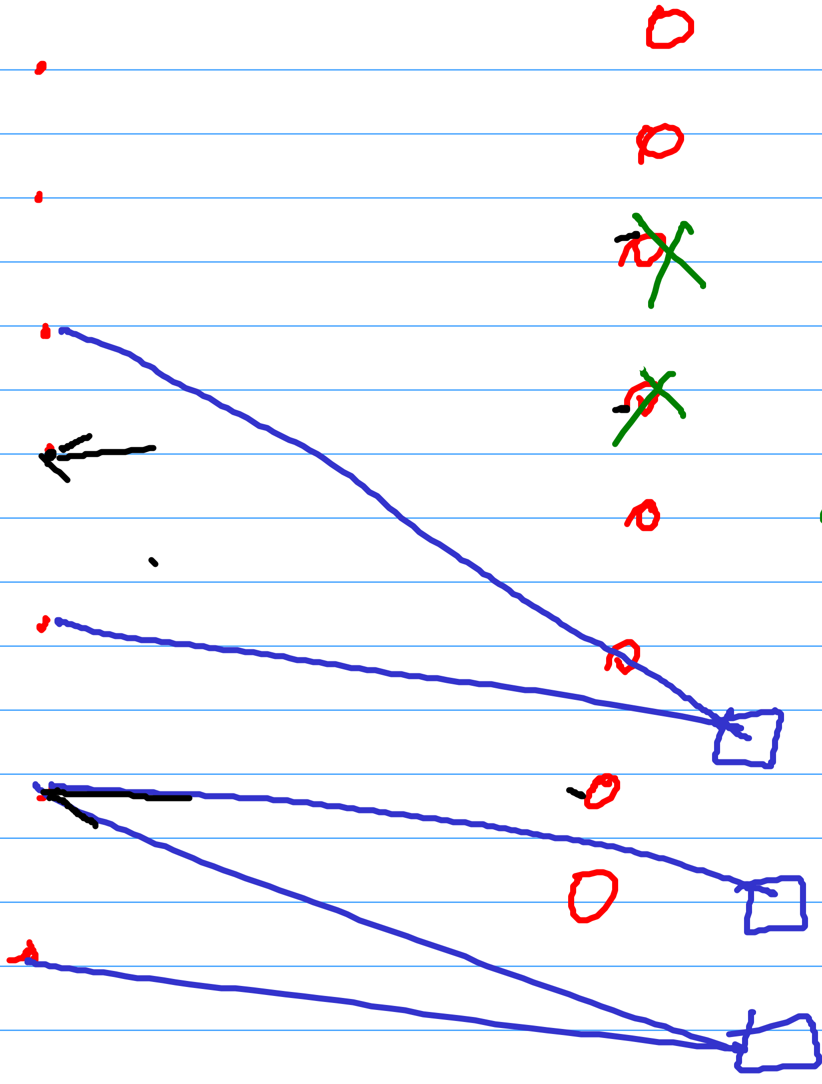
Ranges $\subset \mathbb{F}^d$

↓ defined by the objects

- Kind of ranges: Δ, trapezoids, disks,
- How many objects define the ranges

In the general analysis, as we insert the i^{th} object —

- Some existing ranges have to deleted
- " new ranges " " created
- Objects have to be redistributed



- Some edges will be deleted namely, the ones associated with the ranges being deleted
- Some new edges will be created because of new ranges

Structural change in the i^{th} step
= # edges deleted + # edges created

Total str changes $\le \sum_{i^{th} \text{ insert.}}$ (# edges ~~deleted~~ + created)

Assuming that the algorithmic cost is proportional to the structural changes of the "conflict-graph"

Total Expected cost $= \sum_{i}$ Exp no. of edges created in i^{th} step