

Running times of recursively defined algorithms

Algorithms that are described recursively typically have the following structure:

- ▶ Solve the problem if $n = n_0$; else
 - ▶ Preprocessing
 - ▶ Recursion to one or more smaller problems
 - ▶ Postprocessing

As a result, their running times can be described by recurrence relations of the form

$$t(n_0) = C \text{ (some positive constant)}$$

$$t(n) = f(n) + \sum_{i \in I} t(i) + g(n) \text{ if } n > n_0$$

For the second bullet,

- ▶ $f(n)$ is the preprocessing time
- ▶ I is a set of dataset sizes that we run the algorithm on recursively
- ▶ $g(n)$ is the time for postprocessing