Binary Search

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1 Algorithm

Binary search is an algorithm that finds an element in a sorted array in $\mathcal{O}(\log n)$, where n is the size of the array. This algorithm works by asking each time the middle of the array, so we get rid of a half of the array on each query.

In a general way, this algorithm works if the following property is satisfied:

$$T(i) \leq T(i+1)$$

That means the data is divided into two parts, such that one part satisfies function T(i) and the other do not.

Algorithm 1 Binary Search

Require: l, r, T
Ensure: ans
  while $l \leq r$ **do**
    $mid \leftarrow l + \frac{r-l}{2}$
    if T(mid) is true **then**
      $r \leftarrow mid$
    else
      $l \leftarrow mid$
    end if
  end while
  $ans \leftarrow T(l)$

This pseudo-code may vary, because it all depends on the T function.

2 Classic Problems