cpt_s 350

Homework 2 prime

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Three constraints of "one-pass", "in-place", and "linear time".

1. Two pointers algorithm

    (a) The constraints we put on the two pointers.

    In the algorithm, there are only two pointers (in-place) i and j run on a arrray. Both pointers i and j only move one direction (one-pass). Initially, pointer i is at the far left of the arrow, and it can only moves to the right. Also, point j is at the far right of the arrow, and it can only moves to the left. When the two pointers meet at the same position, they stop moving because the array has finished sorting (linear time).

    (b) The process of the algorithm.

    There is an array with two kinds of value 'p' and 'b' which means babies with purple and brown hair (Each baby has only one hair color, so each cell in the array only has one kind of value). Also, Its relative position is 0 to n from left to right. In addition, there are two pointers i and j which is going to run on the arrow.
    At the beginning of the sort process, the pointer i equals to 0, and the pointer j equals to the length to the arrow, which means pointer i is at the far left of the array, and the pointer j is at the far right of the arrow.

    (c) The psuedo-code of the algorithm.

    ```
    i=0
    j = len(A)
    while i<j {
            if A[i]=='p' {
                    i+=1 }
            else if A[j]=='b' {
    ```

```
                j-=1 }
        else {
                swap(A[i], A[j])
                i+=1
                j-=1
        }
    }
```

2. Three pointers algorithm