CSCI 241

Scott Wehrwein

Sorting algorithm properties:

Stable

In-place

Goals

Know the definition of a stable sorting algorithm.

Know the definition of an in-place sorting algorithm.

Be able to categorize all the sorts we've covered with respect to these properties.

Stability

Objects can be sorted on keys - different objects may have the same value.

A stable sort maintains the order of distinct elements with the same key.

- Example: sort a list of Student objects by first name only
- Example: sorting numbers on 10's place only
- Example: sort colored numbers

[6 2 6 2 3 4]

Stability

A stable sort maintains the order of elements with the same value.

Original: [6 2 6 2 3 4]

Stably sorted: [2 2 3 4 6 6]

Unstably sorted: [2 2 3 4 6 6]

Space Complexity

Time complexity: how many operations?

Space complexity: how much (extra) memory?

- Don’t count the size of the input: we have no choice but to store it!

In-Place

A sort is considered in-place if it requires less than O(n) storage space in addition to the input.

In-Place

A sort is considered in-place if it requires less than O(n) storage space in addition to the input. Example:

```
        insertionSort(A):
1         i = 0;
          while i < A.length:
1           j = i;
            while j > 0 and A[j] > A[j-1]:
1             swap(A[j], A[j-1])
              j--
            i++
```

O(1) space