CS21: INTRODUCTION TO COMPUTER SCIENCE

Prof. Mathieson

Fall 2017

Swarthmore College

Outline Nov 13:

- Selection Sort
- Bubble Sort
- Insertion Sort
- Runtime of these sorting algorithms

Notes

•Lab 8 due Saturday night (read BEFORE coming to lab!)
•Lab 9 due Monday after Thanksgiving
•Quiz 4 this Friday (let me know if you have conflicts)

Sorting

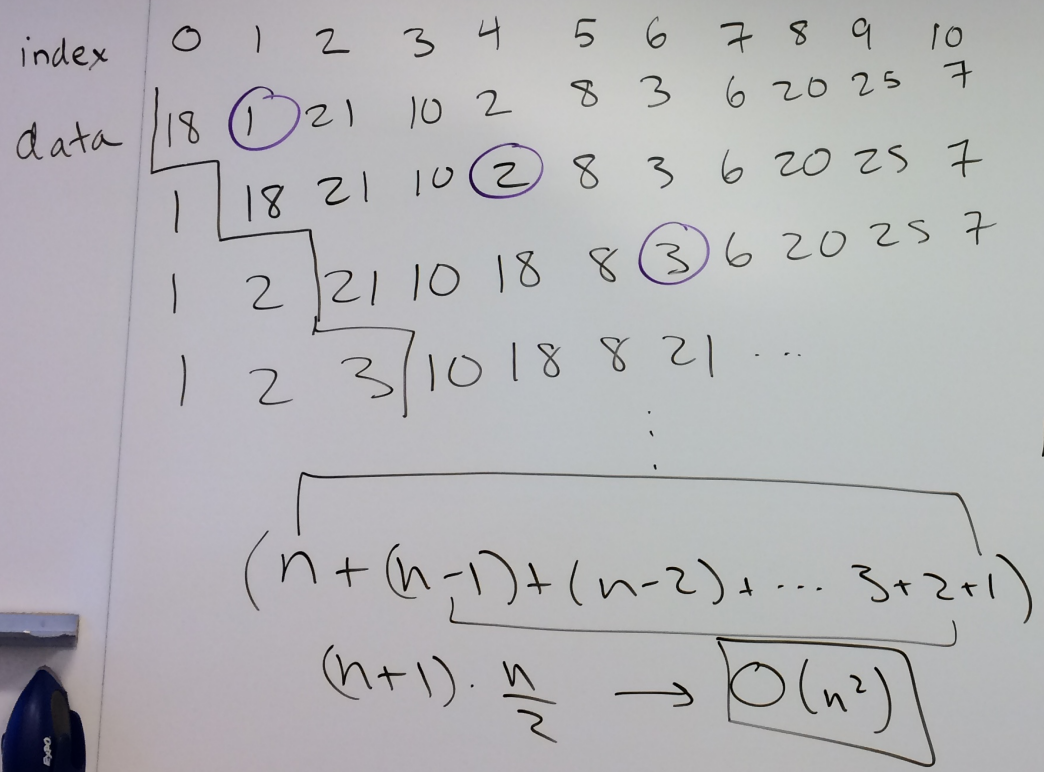
Types of sorting

- **Out-of-place**: leaves the original list alone and creates a new sorted list (returns new list)
- **In-place**: modifies (mutates) the original list via swaps so that it is now sorted
- **Pros of in-place sort**: no new data structure needed (saving space)
- **Cons of in-place sort**: original order destroyed (in some cases it might be important), can be more difficult to implement

3 sorts for today

- **Selection Sort**: iteratively find the minimum element and place it in the correct position
- **Bubble Sort**: move through the list, swapping adjacent elements if they are out of place (repeat until sorted)
- **Insertion Sort**: for each element of the list, move it down until it is in the correct position

Selection Sort Example + Runtime



i	m	time
0	1	n
1	4	n-1
2	6	n-2
⋮		
10	10	1

bubble sort

n
n-1
n-2
⋮
1

$O(n^2)$