Python Class 6: Sorting algorithms and recursion

Michelle Torres

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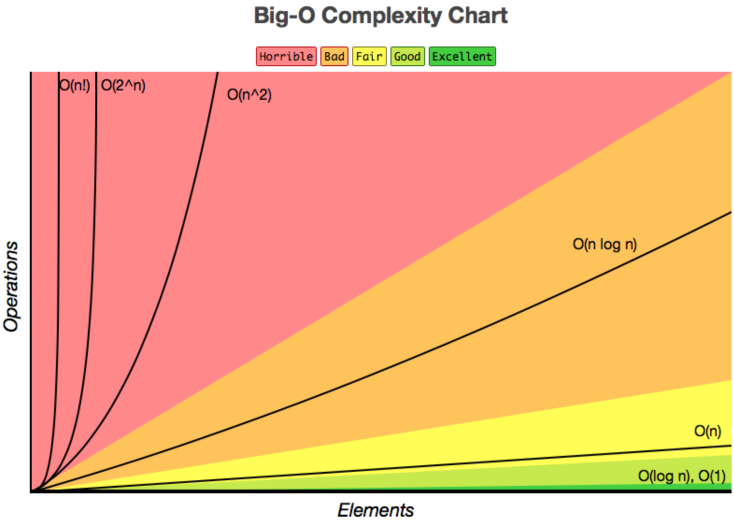
- What about a 3456×123?
- Check the best case, the average case and the **worst case**.

VISUALIZING COMPLEXITY

Visualizing complexity



Insertion Sort

- Start with the element in the second position.
- Insert it to the appropriate position among the numbers to its left.
  - Check whether it is greater than the last element to its left.
  - If not, check the second to last element to its left.
  - ...
- Continue with the element in the third position.

SELECTION SORT

- Go over the unsorted list to find the minimum and place it as your first element of your sorted list.
- Repeat.

Bubble Sort

- Compare - swap stage
  - Compare the first two elements and swap them if necessary.
  - Compare the second and third elements and swap them if necessary.
  - Repeat until the end of the list.
- If you did any swaps in the first stage, repeat it with the first n-1 elements.
- Repeat.

MERGE SORT

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All in action: `https://visualgo.net/bn/sorting`

Recursion

- Function calls itself.
- You need to know:
  - the base case
  - when to call the function
  - when to stop
- The typical example:

$$n! = \begin{cases} 1 & \text{if } n = 0 \\ (n-1)! \times n & \text{if } n > 0 \end{cases}$$