course_content

Searching and Sorting

Week 7

Class Quiz!

bit.ly/DSA1920MidTerm

Searching Algorithms

- What is searching?

- Why are searching algorithms important?

- How do you search in Python? What in-built DS does it work for?

- What is the difference between sequential search and binary search?

- How do the runtimes differ?

- What is the tradeoff made when using binary search?

Searching Algorithms

- Searching answers True or False to whether a given item is present

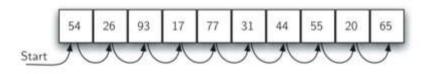- The **in** operator in Python allows us to search lists, sets, tuples, strings and dictionary keys.

| 54 | 26 | 93 | 17 | 77 | 31 | 44 | 55 | 20 | 65 |

Start

Figure 1: Sequential Search of a List of Integers

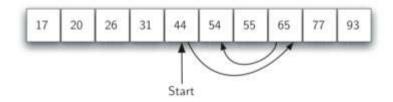| 17 | 20 | 26 | 31 | 44 | 54 | 55 | 65 | 77 | 93 |

Start

Figure 3: Binary Search of an Ordered List of Integers¶

Source: **RuneStone**

Searching Algorithms

- Binary Search of an ordered array will be O(log n) in general

- Sequential Search will be O(n) but can search any array / linked-list

- Ensuring order in an array takes O(n) insert/delete instead of O(1)

- Hash Table Searching can be O(1) with few collisions. (Sets/Dicts in Python!)

Sorting Algorithms

- What is sorting?

- Why are sorting algorithms important?

- What kind of operator do you need to sort elements?

- How do you sort in Python? What in-built DS does it work for?

Sorting Algorithms

- What is sorting?

- Why are sorting algorithms important?

- How do you sort in Python? What in-built DS does it work for?

Sorting Exercise

- Get into groups of 3-4

- Each group will be given a **factor** on which to sort the class into.

- Spend 5 minutes coming up with a strategy on how you will do this as quickly as possible.

- You can only give people **very specific** commands. E.g. go behind this person, stand ahead, what is your ......?

Research Exercise

- Groups of 3-4

- Over the week, you will analyse a sorting algorithm.

- You should explain how it works through a demonstration - anything of your choice

- You should analyse it's run time explaining how it works in best case, average case and worst case as well as space complexity

- Is there recursion or iteration or both in your algorithm?

- You will be asked to present on it on Thursday

Questions?