Algorithm and Data Structure Analysis Notes

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LOOK AT CLUBS FROM FIRST LECTURE

Week 1

Include time complexity notation cheat sheet

Week 3

Radix Sort

Put the last digit of each element into buckets and sort it. Repeat for all the digits until fully sorted. Can do first digit as well (MSD). Order is O(dn+dk) for n numbers on d digits that range from 1 to k.

Counting sort

O(n+k) = O(n) for n inputs in the range of 1 to k.

Order Statistics

The ith order statistic of n elements is the ith smallest element. The minimum is the 1st, and the maximum element is the nth order statistic. The median is the n/2 order statistic. If n is even there are two medians.

Randomized Selection

This is a method to find the ith element statistic. So imagine we want to find the 5th smallest element in an array of size 11. We randomly select a pivot, say 9, and since 9¿5, we put the two largest elements in the array at index 10 and 11. Now we call the function again, with the size 9, still looking for index 5. If we select a new pivot of 2, we put the two smallet elements at the front and call the function again with size 9-2 =7. Here we change the index we are looking for to 3, since we chopped off the first two smallest elements. We keep going until we land on the 5th smallest element.

Week 4

Week 5

AVL Trees

Week 6

Hasing With Chaining

Also known as Open hashing or Closed adressing. Hashing with chaining is a collision resolution technique where each table slot contains a linked list of elements that hash to the same index. When a collision occurs (multiple keys mapping to the same hash value), the new element is appended/preneded to the list.

Hashing with Linear Probing

Here when a collision occurs, the algorithm searches for the next available slot by moving linearly through the table.

Chaining vs Probing

Chanining maintains referential integrity. It potentially takes up a lot of space. Linear probing is a contiguous block of memory which aligns well with modern processors. It does get slower as the table fills up though.

To include in cheat sheet for exam

- Graph algorithms and how they work