Lab Demo 07
goo.gl/fxDA4w

Friday, 19 Oct 2018

Binary Search Tree

- Create a binary search tree in C++
- Write insert function to insert an integer in a BST
- Search in a BST
- Find min and max of a BST
- Find if a BST is balanced or not
- What observation do you have incase of inorder traversal of a BST

PS4 – The Baby Names Problem

Subtask I/Very Easy:

- How many names start with a certain *letter*?

- Be careful of corner case with START and END

- Can be easily solved with Subtask II code too

Subtask II/Easy/Medium, with C++ STL… as explained last week

- How many names start with a certain *prefix*?

Subtask III+IV/Tedious, and 0.5 point somehow :O:

- Subtask II+IV have the same test data, but stricter TL of 1s

- Subtask III has no RemoveSuggestion

Easy Solution for PS4 Subtask I+II

There is one method in *Java* TreeSet (and TreeMap) that can be **very useful** for PS4 Subtask A+B

- For C++, use lower_bound/upper_bound and std::distance

Note that the number of baby names with same 1st letter is evenly distributed!!

- Can create sets for each alphabet! (size reduced to N/26 for each set, so 20K/26 ~= 5k)

- For each alphabet between 1st letter of START and END, just get their entire set size!

- For START and END, use std::distance to get the range within itself (still O(N), but 5k in each set, O(QN) solution feasible)

- Also consider the case if START and END have the same 1st letter

- Note, should we use separate sets for male and female, or put them together (and why?)?

What about PS4 Subtask III?(1)

Constraint N =200k and Q = 500k (from 20k in II)!!

- You have to **emulate those STL functions**
  - And do faster than O(n) distance calculations… (e.g. O(1), O(log(N), etc.)

First of all, you BST has to be **balanced** ☺

- You have gone through the entire Lecture on Week08 for this
  - Implementing that data structure correctly by yourself is a challenge

What about PS4 Subtask III?(2)

Second, your method has to run in **O(log n)**

- Any non **O(log n)** solution should theoretically will get TLE
- Hint: Scrutinize the "Rank" method that is briefly touched in tutorial tut07

You have 15 more days before PS4 is due to do all these, if you choose to do so ☺

VisuAlgo Training Mode

Make sure that you understand the explanation in:

https://visualgo.net/en/bst?slide=1 (until the last slide) and

Now let's use VisuAlgo Online Quiz training mode to check your basic understanding about BST/AVL on "infinite" number of random questions:

https://visualgo.net/training?diff=Hard&n=5&tl=5&module=bst,avl

Mock PE 2

Solve https://open.kattis.com/problems/compoundwords

Before this Lab session runs out (xx.45)!!

Start from this template code

Gradual hints will be added in few minutes interval