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98. Validate Binary Search Tree

Notes

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Learn one iterative inorder traversal, apply it to multiple tree questions (J…

32.6K

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Last Edit: 16 hours ago (/issac3) issac3 (/issac3) ★ 1707

I will show you all how to tackle various tree questions using iterative inorder traversal. First one is the standard iterative inorder traversal using stack. Hope everyone agrees with this solution.

Question : Binary Tree Inorder Traversal (https://leetcode.com/problems/binary-tree-inorder-traversal/)

```
public List<Integer> inorderTraversal(TreeNode root) {
    List<Integer> list = new ArrayList<>();
    if(root == null) return list;
    Stack<TreeNode> stack = new Stack<>();
    while(root != null || !stack.empty()){
        while(root != null){
            stack.push(root);
            root = root.left;
        }
        root = stack.pop();
        list.add(root.val);
        root = root.right;

    }
    return list;
}
```

Now, we can use this structure to find the Kth smallest element in BST.

Question : Kth Smallest Element in a BST (https://leetcode.com/problems/kth-smallest-element-in-a-bst/)

```
public int kthSmallest(TreeNode root, int k) {
    Stack<TreeNode> stack = new Stack<>();
    while(root != null || !stack.isEmpty()) {
        while(root != null) {
            stack.push(root);
            root = root.left;
        }
        root = stack.pop();
        if(--k == 0) break;
        root = root.right;
    }
    return root.val;
}
```

Notes

We can also use this structure to solve BST validation question.

Question : Validate Binary Search Tree (https://leetcode.com/problems/validate-binary-search-tree/)

```
public boolean isValidBST(TreeNode root) {
   if (root == null) return true;
   Stack<TreeNode> stack = new Stack<>();
   TreeNode pre = null;
   while (root != null || !stack.isEmpty()) {
      while (root != null) {
         stack.push(root);
         root = root.left;
      }
      root = stack.pop();
      if(pre != null && root.val <= pre.val) return false;
      pre = root;
      root = root.right;
   }
   return true;
}
```

Comments: 19

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ra1nbow (/ra1nbow) ★ 6 Feb 5, 2018, 10:06 AM

can anyone help me to find why when i run my code, it occurs the time limit problem? Big thx!!!

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labonya (/labonya) ★ 2 ⊙ Jan 17, 2018, 1:07 PM

@issac3 Great job. Thanks.
The same solution can also be done in O(n) using if-else instead of the inner while
public boolean isValidBST(TreeNode root) {

```
    Stack<TreeNode> sTree = new Stack<>();
```

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RogerFederer (/rogerfederer) ★ 98 ⊙ Jan 4, 2018, 10:35 PM

Nice code, easy to read and understand

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yifan-liu (/yifan-liu) ★ 0 ⊙ Oct 30, 2017, 11:08 AM

Here is a python version of this algo:

```
class Solution(object):
#     An iterative solution
    def isValidBST(self, root):
        stack = []
```

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tanjina (/tanjina) ★ 0 ⊙ Oct 25, 2017, 9:31 PM

Clean and good explanation

0 ⌃ ⌄ | Report post

anandh_07 (/anandh_07) ★ 0 ⊙ Oct 8, 2017, 4:08 AM

Clean and simple. Very much helpful. Thank you so much :)

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Zerone01 (/zerone01) ★ 0 ⊙ Sep 9, 2017, 10:06 AM

@issac3 said in Learn one iterative inorder traversal, apply it to multiple tree questions (Java Solution) (https://discuss.leetcode.com/post/47701):

> pre

Concise and practical summary. Useful~ ~~

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nyLiyuech (/nyliyuech) ★ 0 🕘 Aug 9, 2017, 2:51 AM

@issac3 good summary

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wangruinju (/wangruinju) ★ 2 🕘 May 23, 2017, 11:19 PM

very nice summary!
Thanks a lot!

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qslvhw2 (/qslvhw2) ★ 0 🕘 Apr 4, 2017, 12:00 PM

@issac3 very clean code and clear logic!! thanks.

0 ⌃ ⌄ Report post

Notes

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