

Assignment 4

1 Sorting using a BST

- The tree traversal suitable in this case is the inorder one: it will give the following sequence: a a e e g i l m n o p r s t x.
- A sorting method consists on building a BST using successive insertions at the leaf and then using the inorder traversal. The first operation takes $O(\text{height of the tree} * n)$, where n is the size of the array to be sorted. The traversal takes $O(n)$.

2 Remove operation in a BST

Algorithm 1. *remove*: $tree \times item \rightarrow tree$

1. $remove(< x, emptyTree(), emptyTree() >, x) = emptyTree()$
2. $remove(< x, emptyTree(), d, x) = d$
3. $remove(< x, g, emptyTree() >, x) = g$
4. if g and d are different from the empty tree then $remove(< x, g, d >, x) = < max(g), max(g), d >$

Algorithm 2. *max*: $tree \rightarrow node$

1. $max(< r, g, emptyTree() >) = r.$
2. if $d \neq emptyTree()$, then $max(< r, g, d >) = max(d)$

Algorithm 3. *m̄ax*: $tree \rightarrow tree$

1. $m̄ax(< r, g, emptyTree() >) = g$
2. if $d \neq emptyTree()$ then $m̄ax(< r, g, d >) = < r, g, m̄ax(d) >$

3 Quicksort: example

A S O R T I N G E X A M P L E
A A O R T I N G E X S M P L E
A A M E L I N G E O S X P T R
A A G E L I E M N O P R S T X
A A E E G I L M N O P R S T X