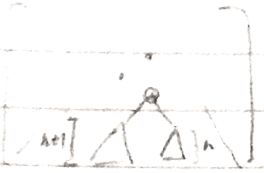
CSC263 Wednesday Lecture

Jan 2018

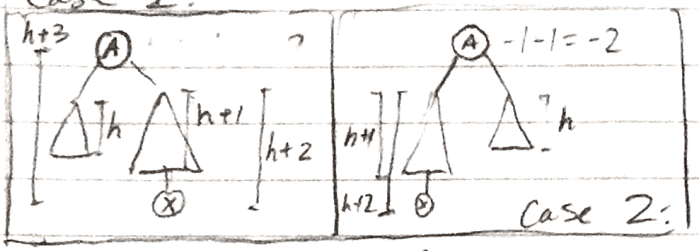


AVL ≡ BST s.t. $\forall v$, $BF(v) \in \{-1, 0, 1\}$

AVL height is $O(\log n)$ $[\leq 1.99 \log_2(n+2)]$

Let: (A) be the first node on path $x \rightsquigarrow$ root that becomes unacceptably unbalanced ($|BF(A)| \geq 2$)

Case 1:



these cases are symmetric, same processes so we will look at only case 1

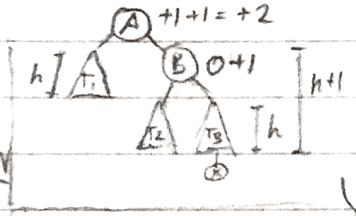
THE ROTATION

① Rebalance subtree

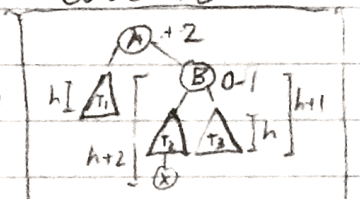
② restore height to [h+2] what it was before insertion of (X)

③ preserves BST property

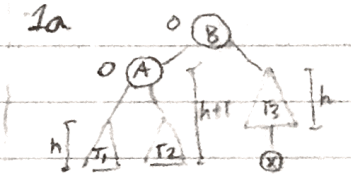
Case 1a:



Case 1b:



LEFT ROTATION

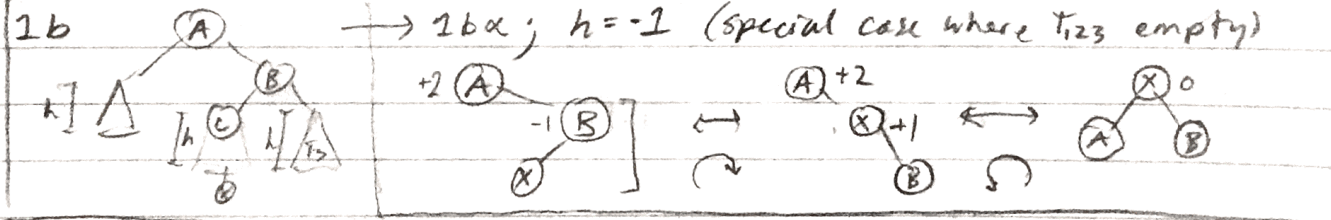


$\{T_1, A, T_2, B, T_3\}$ → $\{T_1, A, T_2, B, T_3\}$ } In-order transversal same. BST property preserved.

Note: it is safe to assume that subtrees of (B) are balanced before insertion (other cases impossible)

LEFT ROTATION

1b → 1bα; h = -1 (special case where T_{123} empty)



1bβ h ≥ 0