

2020-02-25 Trees

Tuesday, February 25, 2020 1:14 PM

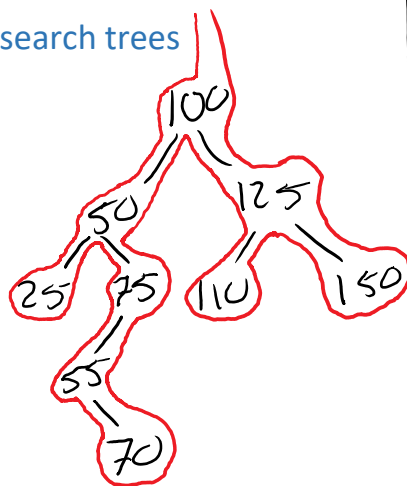
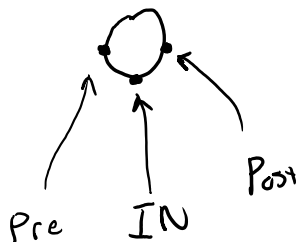
Terms and such

- Binary Tree - a tree in which every node has at most 2 children

Recursive / Depth-First Traversals

- Pre-order traversal - process current node ("us") before processing children
- In-order traversal - processing left subtree prior to "us" followed by right subtree
- Post-order traversal - processing left subtree, right subtree, then us
- Written differently:
 - Pre-order: Us-Left-Right (ULR)
 - In-order: LUR
 - Post-order: LRU

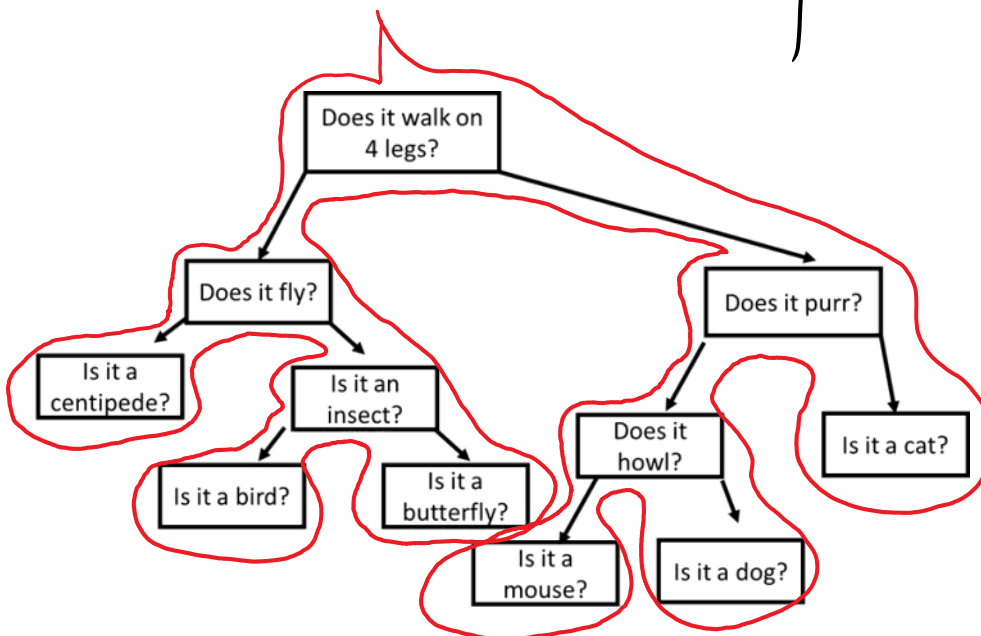
Examples using binary search trees



Pre: 100, 50, 25, 75,
55, 70, 125, 110, 150

IN: 25, 50, 55, 70, 75,
100, 110, 125, 150,

POST: 25, 70, 55, 75, 50,
110, 150, 125, 100



PRE: Walk, Fly, Centipede, Insect, Bird, Butterfly, Purr, Howl, Mouse, Dog, Cat

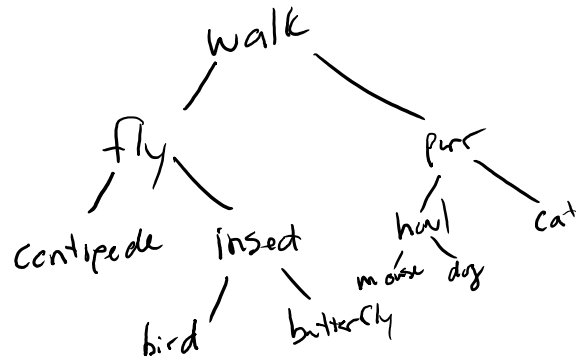
IN: Centipede, Fly, Bird, Insect, Butterfly, Walk, Mouse, Howl, Dog, Purr, Cat

POST: Centipede, Bird, Butterfly, Insect, Fly, Mouse, Dog, Howl, Cat, Purr, Walk

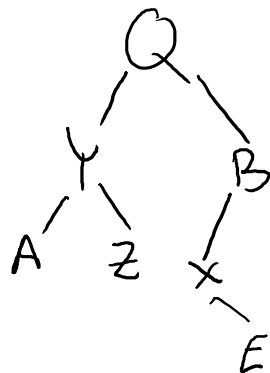
Reconstructing a tree based on an Pre-Order with knowledge of leaf nodes

Algorithm:

- If not leaf node, take next value. Send remaining values to left child. After return from left child, send remaining to right child.
- If leaf node, take value. Return to parent.



Does it walk on 4 legs?
 Does it fly?
 *centipede?
 Is it an insect?
 *bird?
 *butterfly?
 Does it purr?
 Does it howl?
 *mouse?
 *dog?
 *cat?



Pre:

Q, Y, A, Z, B, X, E

In:

A, Y, Z, Q, X, E, B