Tree Traversals

Vivek K. S., Deepak G.

Information Systems Decision Sciences (ISDS)
MUMA College of Business
University of South Florida
Tampa, Florida

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Introduction

With a solid understanding of trees and advantages of tree data structures, we can look at tree traversals.

- There are three commonly used patterns to visit all the nodes in a tree.
- They differ by the order in which the nodes are visited.
- The three traversals we will look at are called preorder, inorder, and postorder.
- Preorder - In a preorder traversal, we visit the root node first, then recursively do a preorder traversal of the left subtree, followed by a recursive preorder traversal of the right subtree.
- Inorder - In an inorder traversal, we recursively do an inorder traversal on the left subtree, visit the root node, and finally do a recursive inorder traversal of the right subtree.
- Postorder - In a postorder traversal, we recursively do a postorder traversal of the left subtree and the right subtree followed by a visit to the root node.

Preorder Traversal

We could have an external method as follows:

```
def preorder(tree):
    if tree:
        print(tree.get_root_val())
        preorder(tree.get_left_child())
        preorder(tree.get_right_child())
```

An internal method could be implemented as follows:

```
def preorder(self):
    print(self.key)
    if self.left_child:
        self.left.preorder()
    if self.right_child:
        self.right.preorder()
```

Preorder and Inorder Traversal

The algorithm for the postorder traversal is nearly identical to preorder except that we move the call to print to the end of the function.

```
def preorder(tree):
    if tree:
        print(tree.get_root_val())
        preorder(tree.get_left_child())
        preorder(tree.get_right_child())
```

In the inorder traversal we visit the left subtree, followed by the root, and finally the right subtree.

```
def inorder(tree):
    if tree != None:
        inorder(tree.get_left_child())
        print(tree.get_root_val())
        inorder(tree.get_right_child())
```

Summary

- We learned Tree traversal and why it is important.
- We also learned the three commonly used patterns to traverse tree data structures.
  - Preorder,
  - Inorder and
  - Postorder.