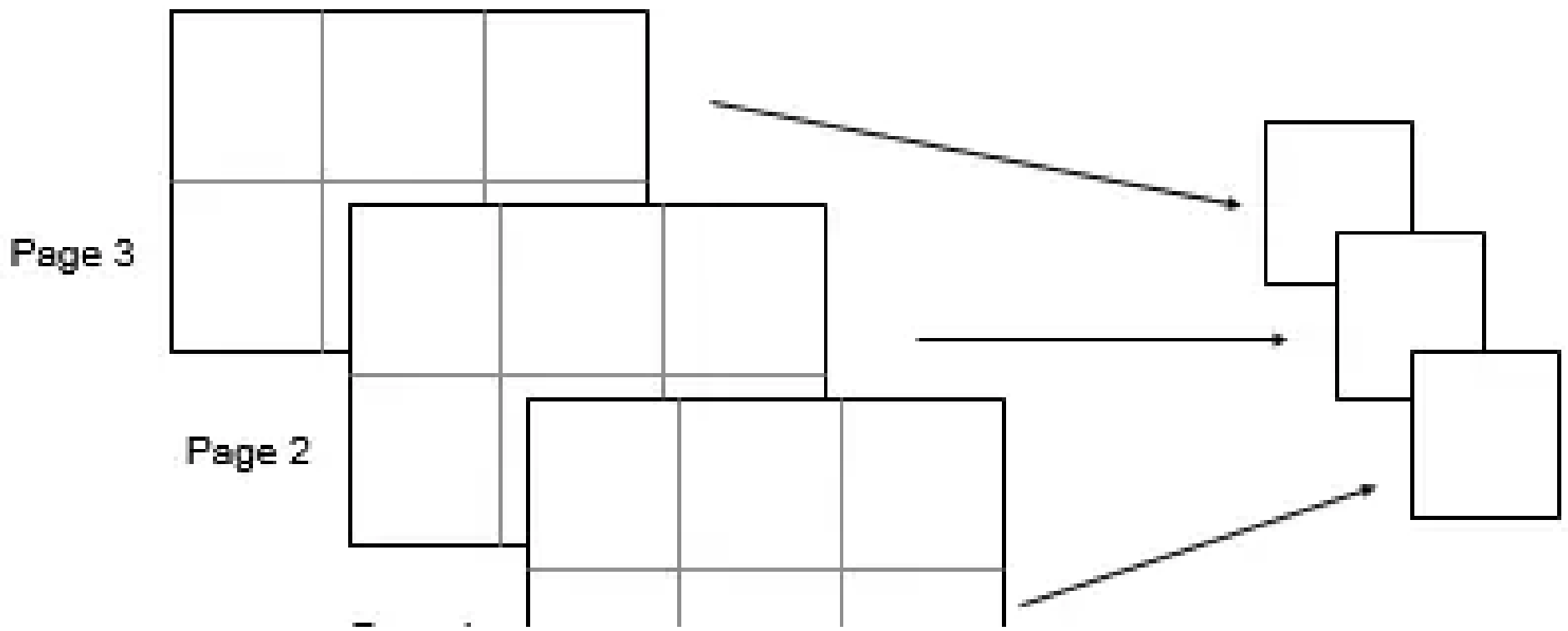
NiSAR



Binary Trees

Branch Sums

Sameer May 20, 2021 • 1 min

Branch Sums

Write a function that takes in a Binary Tree and returns a list of its branch sums ordered from leftmost branch sum to rightmost branch sum.

A branch sum is the sum of all values in a Binary Tree branch. A Binary Tree branch is a path of nodes in a tree that starts at the root node and ends at any leaf node.

Each `BinaryTree` node has an integer `value`, a `left` child node, and a `right` child node. Children nodes can either be `BinaryTree` nodes themselves or `None / null`.

Sample Input

```
tree =     1
         /     \
        2       3
      /   \    /  \
     4     5  6    7
   /   \  /
  8    9 10
```

Sample Output

```
[15, 16, 18, 10, 11]
// 15 == 1 + 2 + 4 + 8
// 16 == 1 + 2 + 4 + 9
```

```
// 18 == 1 + 2 + 5 + 10
// 10 == 1 + 3 + 6
// 11 == 1 + 3 + 7
```

Hints

Hint 1 Try traversing the Binary Tree in a depth-first-search-like fashion.

Hint 2 Recursively traverse the Binary Tree in a depth-first-search-like fashion, and pass a running sum of the values of every previously-visited node to each node that you're traversing.

Hint 3 As you recursively traverse the tree, if you reach a leaf node (a node with no "left" or "right" Binary Tree nodes), add the relevant running sum that you've calculated to a list of sums (which you'll also have to pass to the recursive function). If you reach a node that isn't a leaf node, keep recursively traversing its children nodes, passing the correctly updated running sum to them.

Optimal Space & Time Complexity O(n) time | O(n) space - where n is the number of nodes in the Binary Tree

Solution 1

```
DEFINE CLASS BinaryTree:
    DEFINE FUNCTION __init__(self, value):
        SET self.value TO value
        SET self.left TO None
        SET self.right TO None

# O(n) time | O(n) space - where n is the number of nodes IN the Binary Tree
DEFINE FUNCTION branchSums(root):
    SET sums TO []
    calculateBranchSums(root, 0, sums)
```

```
    RETURN sums

DEFINE FUNCTION calculateBranchSums(node, runningSum, sums):
    IF node is None:
        RETURN
    SET newRunningSum TO runningSum + node.value
    IF node.left is None and node.right is None:
        sums.append(newRunningSum)
        RETURN
    calculateBranchSums(node.left, newRunningSum, sums)
    calculateBranchSums(node.right, newRunningSum, sums)
```

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