Programming Assignment 3

Time Complexity of Loading and Creating a Binary Tree

The algorithm works by first reading the file line by line and determining the number of nodes that will the binary tree will have. Then the algorithm reads the file line by line and stores each of the lines in a separate node. Once the file content is stored into the array, the binary tree is reconstructed from its post order traversal using a stack. The algorithm goes through the file n times and once the data is stored into an array the algorithm goes through the elements one item at a time to create n number of nodes. Therefore the time complexity of reading and creating a binary tree from a file is of the time complexity O(n).

Time Complexity of the Packing Algorithm

The packing algorithm works by recursively going through the binary tree and adjusting the x coordinates and y coordinates of the leaf nodes depending on whether their parent is a ‘V’ or a ‘H’ node. This efectively creates a “container” that determines the width and the height that is occupied by each child node. Once the first recursion is done. It recurses a second time to shift the x and y coordinates depending on cut-line of their parent node. Since it goes through each node only one time the time complexity of the algorithm is O(n).