

Walkthrough of Code :

The huffman tree is composed of nodes that are constructed into a single tree, ordered by the individual character's frequency in a message. After traversing the leaf nodes of the huffman tree, each character and their directions in the tree can be appended to a dictionary. To encode a message would involve iterating through a string and appending the corresponding directions in the tree dictionary to an encoded string. To decode a string would be similar, iterating through the encoded message, and appending the corresponding character to a decoded string.

Time Complexity: $O(n)$

As the string message, the time complexity would vary linearly. A huffman tree is constructed in a linear time complexity, iterating over itself, while constructing a tree of the two smallest nodes out of the list of nodes. Encoding a huffman tree would involve traversing the whole tree, with a record of the directions, and appending after an individual path has reached a leaf node. To decode a message would involve iterating through every character's value to decode the message.

Space Complexity: $O(n)$

The space complexity varies with the length of the string message. The tree appends nodes for the individual characters in the message, as the dictionary appends the path for each of the nodes.