Harsh Patel
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Project 3

The data structures I used for this project were a linked list and a hash table because I am most comfortable with them. It felt appropriate to use only these 2 data structures because it made computations and algorithms easier to accomplish in my head. I used a hash table first to map out all the characters with their frequencies. Once all the values and frequencies were mapped, I dumped all the information I acquired from the hash table into a linked list and sorted it. After the linked list was sorted by weight, I built the huff tree in one for loop; this made everything else easy to compute because each node in the linked list contained an object which had a left child, right child, weight, and value. After building the tree, I made another linked list in which each node had a character and its associated code from the tree. Computational complexity of my encoding algorithm was $O(n^2)$ because I had to traverse the string of text from the document and then my linked list to figure out which character corresponded to the correct code value. My decoding algorithm was also $O(n^2)$ because I had to traverse the string of code generated by the encoding algorithm and then traverse my linked list to figure out which code belonged to which character. Lastly, my traversal method was of O(n) complexity because all I had to do was traverse my linked list that contained the code and character value and print it out. I learned how compression works from this project, and it has further increased my knowledge in Compute Science.