Huffman

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When running the program and calling the main function, one can enter a text, the size of the encoding alphabet, and get the an encoding back. The user will then be prompted to either press one to decode the text again or to exit the method. If the user chooses to decode, the decoded text will be printed, matching the input text. The program can therefore construct an n-ary tree.

I use functions defined in prelude, such as getLine, uncurry, compare and foldr. Further more i use the Data.List module, where I use sort and insert, which can be used as NTree (the datatype I have implented) is in both the Eq and Ord classes, where compares on the frequency of a node. The program works by finding the unique characters and their values and constructing a leaf node with these values. The Huffman tree is then constructed given a list of NTree's, it then uses the algorithm described in the book, more or less, to construct the tree. I use the Huffman tree to make a list of characters and their encoding, such that i can look up the character and get the encoding. Encoding the message is then easy using folding, append and lookup.

The encode function return both the encoding and the Huffman tree. The decode function can traverse the Huffman tree, by going to the correct branch dependant upon the next integer in the encoding sequence, or consing a character to the rest of the decoded string if it is a leaf recursively. If a leaf node is reached, the rest of the recursive sequence have to have the root of the tree again.

I have defined one datatype and one synonym. The datatype NTree is a n-ary tree with a term constructor Leaf that takes a Char, then a Int and return NTree ($Leaf :: Char- > Int- > NTree$)) and the other is $Branch :: [NTree]- > - > Int- > NTree$. The NTree datatype is therefore able to represent the Huffman tree. The datatype is a part of the Show class. Furthermore NTree is also a part of Eq and Ord, where I have made a specific instance insure that NTrees are compared on their frequency.