CSE 2320 Lab Assignment 3

Due March 8, 2018

Goals:

1. Understanding of Huffman code trees.

2. Understanding of the five steps for developing a dynamic programming solution.

Requirements:

1. Use C to implement *order-preserving* Huffman coding - using the dynamic programming formulation described in Notes 7.C.

   The input is 1) a positive integer n and 2) a sequence of n `doubles` giving the probabilities for symbols in an ordered character set. To simplify output, the character set will be referenced numerically as 0 . . . n - 1.

   Your program should output 1) the optimal order-preserving Huffman code tree and 2) the bit code assigned to each symbol and the expected bits per symbols $\left(\sum_i length_i \bullet prob_i \right)$ based on the generated code tree and the input probabilities.

2. Submit your program on Blackboard by 3:15 p.m. on March 8, 2018. One of the comment lines should include the compilation command used on OMEGA.

Getting Started:

1. Be sure to understand ordinary (greedy) Huffman codes and the dynamic programming solution for the optimal matrix multiplication ordering problem first.

2. The code for filling in the cost matrix will be very similar to optimal matrix multiplication ordering. You are not required to include the cost matrix in your output.

3. Outputting the optimal order-preserving Huffman code tree is just like outputting the tree for the optimal matrix multiplication ordering.

4. Determining the bit string for each character requires navigating down the tree. Going left gives a `0`, going right gives a `1`. (Recursion is not needed.)