

Lab 2: Source Coding - Huffman Coding

Lab Assignment 1: Entropy Calculation

Develop a matlab program that allows you to plot the entropy of a source with variable output probabilities. We wish to observe that the maximum source entropy does indeed occur when the source outputs are equally likely. Start with a simple two-output source $[m_1, m_2]$ with respective probabilities $[a, 1 - a]$ and plot the entropy as a function of the parameter a . Then consider more complex cases such as a three output source $[m_1, m_2, m_3]$ with respective probabilities $[a, b, 1 - a - b]$. Be creative with the manner in which the results are displayed.

Lab Assignment 2 : Huffman Encoding

In this exercise, Huffman coding will be applied to compress pcm.wav file. The program steps are as follows:

1. Read pcm.wav file into vector y (you can truncate the original data to the desired length);
2. Quantize y into 8 levels (level 0-7) using uniform quantization;
3. Find the probability of each symbol (8 symbols: level 0-7); construct the Huffman tree; calculate the entropy of the source.
4. Encode the symbols and form the bit stream.
5. Calculate the coding efficiency (average length of bits/symbol over entropy), and compression ratio compared with PCM encoding.

Lab Assignment 2 : Huffman Decoding

Write a program to decode the Huffman-coded bit stream given the Huffman table. Run this program on your coded data in part I and compare the decoded symbols with the transmitted ones.

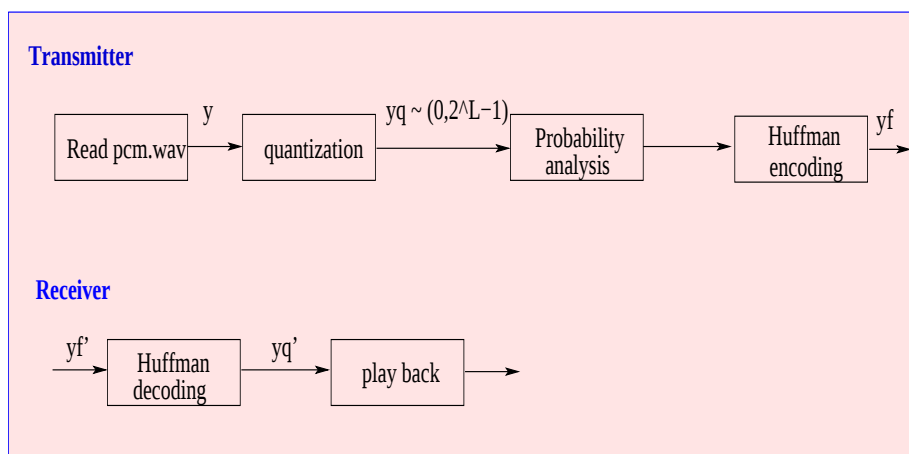


Figure 1: Lab 2: Procedure diagram.