

Exercises Week 7

Information Theory

1. A discrete memoryless source has the following distribution:

$$S : \begin{pmatrix} s_1 & s_2 & s_3 \\ 0.1 & 0.7 & 0.2 \end{pmatrix}$$

- Done in previous week:* Find the average code length obtained with Huffman coding on the original source and on its second order extension.
 - Encode the sequence $s_7 s_7 s_3 s_7 s_7 s_1 s_3 s_7 s_7$ with both codes.
 - Decode the binary sequence 011100101000101110100 with both codes
2. A discrete memoryless source has the following distribution

$$S : \begin{pmatrix} s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_7 & s_8 \\ 0.4 & 0.3 & 0.2 & 0.04 & 0.03 & 0.02 & 0.009 & 0.001 \end{pmatrix}$$

- Do Huffman coding of the source for a code with 4 symbols, x_1 , x_2 , x_3 and x_4 , and encode the sequence

$$s_1 s_7 s_8 s_3 s_3 s_1$$

- Draw the graph of the code and compute the average length of the code
- Do binary Huffman coding of the same source (2 symbols, 0 and 1) and compute the average length. Which code is more efficient, the binary or the quaternary one?