
Multimedia Systems
Exercise No. 5

Entropy Coding

1. Let t be a text with a “normal” 8-bit coding (ISO 8859-1).
 - a) What is the entropy of a text which contains all 256 possible characters with the same probability?
 - b) Determine an upper and a lower bound of the entropy for a text coded this way.

2. Let t be the following text: DIES IST EIN KURZER TEXT
 - a) What are the absolute and relative occurrences of each character (including the spaces)?
 - b) What is the self information (in bit) of each character?
 - c) What is the entropy (in bit) of t ?
 - d) Based on the shannon coding theorem, what do we know about the possible average code length?
 - e) Create a huffman tree for t . How can the characters of t be encoded and decoded with this tree?
 - f) Determine the total length and the average codeword length of t (in bit) with
 - i. a “normal” 8-bit coding (ISO 8859-1).
 - ii. a coding fitted to the alphabet used in the text.
 - iii. a huffman coding.
 - iv. an (theoretically) optimal coding.