

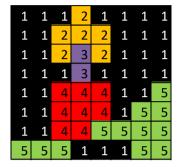
Computer Science Fundamentals WS 2021/22

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Please solve the following exercises at home prior to the tutorial

Excercise 1

Given is the following image consisting of the colour values 1, 2, 3, 4, and 5. The individual pixels are stored row-wise.



- a) Determine the occurrence probabilities for the different colour values in the shown image.
- b) Give a minimum length binary code with constant word length and calculate the size (in bit) for the encoded image.
- c) Create an optimal code of variable word length using Huffman. What is the size of the Huffman-encoded image in bits?
- d) Define an efficient (block) code for run-length encoding. How many bits does it take to store the image if:
 - first the block code from b) is applied and then the run-length encoding from d)?
 - first the Huffman-code from c) is applied and then the run-length encoding from d)?

Excercise 2

Encode the word PAPAYA using arithmetic coding. Decode the resulting code word for self-checking. The symbols in the necessary table should be arranged in alphabetical order.

The following exercises will be done during the tutorial

Exercise 3

Encode the word PAPAYA using LZW compression. For self-checking, decode the result. Initialise the code-table using single characters in their appearance order in the word.