

Exercise Multimedia Technology WS 2003/2004

Sheet 1 (October 24th 2003)

1.1 Huffman coding

Please code the string MISSISSIPPI using the algorithm invented by Huffman. Calculate the relative occurrence first and afterwards build the tree accordingly. How great are the savings with regard to an 8-Bit coding of the string?

relative occurrence:

M	1/11
I	4/11
S	4/11
P	2/11

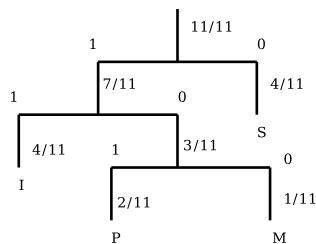


Figure 1: One possible Huffman tree among many alternatives

Bit pattern:

M	100
I	11
S	0
P	101

1.2 Lempel-Ziv Welch coding

Please code the string MISSISSIPPIMISSISSIPPI using Lempel-Ziv coding in the version of Welch (the one taught in the lecture). The predefined alphabet looks like this:

1	I
2	M
3	P
4	S
5	...

1	I
2	M
3	P
4	S
5	MI
6	IS
7	SS
8	SI
9	ISS
10	SIP
11	PP
12	PI
13	IM
14	MIS
15	SSI
16	ISSI
17	IP
18	PPI

Output: 2, 1, 4, 4, 6, 8, 3, 3, 1, 5, 7, 9, 1, 11, 1

Which is the minimum number of bits needed to store or transmit the resulting index values?

1.3 Arithmetic coding

The following table defines probabilities for the alphabet a,b,c,d,e . Please code the string aabdcea using static arithmetic coding. In the interval which you will use begin with the letter a.

Letter	Probability
a	0.3
b	0.2
c	0.1
d	0.1
e	0.3

