

BMMS2633 Advanced Discrete Mathematics

Tutorial 7

- (1) Which of the following source codes are prefix free?

Code A	Code B	Code C	Code D
0111	11	11	111
011	10	00	110
01	01	0	10
0	00	1	0

- (2) (a) Construct a Huffman code using the letters and probabilities given below.

M	E	C	T	A	H	I	S
0.01	0.25	0.03	0.15	0.30	0.05	0.20	0.01

- (b) Suppose the Huffman code for 8 letters are given as below.

M	E	C	T	A	H	I	S
10110	01	101111	100	00	1010	11	101110

Find the word represented by 1011000100101001101100010011101111101110.

- (3) Use Huffman coding to encode these symbols with given probabilities:

a: 0.20, b: 0.10, c: 0.15, d: 0.25, e: 0.30

What is the average code length?

- (4) Suppose the 5 letters and their probabilities are given below.

Letter	A	E	S	O	N
Probability	0.40	0.20	0.18	0.12	0.10

Calculate the average word length using these probabilities.

- (5) Construct two different Huffman codes for the symbols and probabilities given below:

F: 0.15, G: 0.2, J: 0.2, K: 0.45

- (6) Find a Huffman code for a source alphabet a_1, a_2, a_3, a_4 with probabilities of occurrence 0.50, 0.25, 0.15, 0.10 respectively. Calculate the average code length, entropy and efficiency.

- (7) Construct a Huffman code for the character and number of occurrences in the following table.

Character	e	h	l	s	p	t	w	Total
Number of occurrences	3320	1458	1067	1749	547	2474	266	10881

- (a) Find the average code length.
(b) Find the entropy and efficiency.

Answers

(3) 2.25

(4) 2.2

(6) 1.75, 1.7427, 99.58%

(7) (a) 2.5422 (b) 2.4971, 98.23%