

E E 5359 Video Coding

Test # 1

For VCR students
Summer
2003

1), [20 points]

Problem Ch 5, 4 (a)

A sequence is encoded using the LZW algorithm and the initial dictionary shown in the table below:

Index	Entry
1	a
2	b
3	h
4	i
5	s
6	t

a), The output of the LZW encoder is the following sequence:

6	3	4	5	2	3	1	6	2	9	11	16	12	14	4	20	10	8	23	13
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Decode this sequence.

2), [20 points]

Ch 5, 3

Given an initial dictionary consisting of letters *a b r y*, encode the following message using LZW algorithm:

a b a r b a r r a y b b y b a r r a y a r b a y

Index	Entry
1	a
2	b
3	r
4	y
5	h

Ch 3, 4

3), [25 points]

A source emits letter from an alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ with probabilities

$$P(a_1) = 0.15, P(a_2) = 0.04, P(a_3) = 0.26, P(a_4) = 0.05, P(a_5) = 0.5$$

- a), Calculate the entropy of this source.
- b), Find a Huffman code for this source
- c), Find the average length of the code in (b) and its redundancy.

4), [15 points]

Ch 3, 13

For an alphabet $A = \{a_1, a_2, a_3\}$ with probabilities

$$P(a_1) = 0.7, P(a_2) = 0.2, P(a_3) = 0.1$$

Design a 3-bit Tunstall code

5), [20 points]

Ch 4, 5 (the sequence is changed from $a_1 a_1 a_3 a_2 a_3 a_1$

Given the probability model in the following table, find the real valued tag for the

sequence: $S_1 S_1 S_3 S_2 S_1$

to $S_1 S_1 S_3 S_2 S_1$)

letter	probability
S_1	0.2
S_2	0.3
S_3	0.5