

EE.5351 Digital Video Coding

Instructor: K.R.Rao

Test #1
(Open Book & Open Notes)

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Student Name: _____
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1. [15 points]

Symbol	Probability
S_1	0.3
S_2	0.1
S_3	0.35
S_4	0.25

- Find Huffman code, the Huffman code tree and redundancy
- Find minimum variance Huffman code, the minimum variance Huffman code tree and redundancy.
- Comment on the difference between (a) and (b)

2. [15 points]

For an alphabet $A = \{a_1, a_2, a_3\}$ with probabilities $P(a_1) = 0.3$, $P(a_2) = 0.6$, $P(a_3) = 0.1$, design a 3-bit Tunstall code.

3. [15 points]

Given the probability model in the following table, find the real valued tag for the sequence $S_1 S_1 S_2 S_3 S_2$.

Symbol	Probability
S_1	0.2
S_2	0.3
S_3	0.5

4. [20 points]

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

Index	Entry
1	a
2	∅
3	r
4	t

The output of the LZW encoder is the following sequence:

3	1	4	6	8	4	2	1	2	5	10	6	11	13	6
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Decode this sequence.

5. [15 points]

A sequence is encoded using LZ77 algorithm, Given that $C(a)=1$, $C(\emptyset)=2$, $C(r)=3$, and $C(t)=4$, decode the following sequence of triples:

$\langle 0,0,3 \rangle$ $\langle 0,0,1 \rangle$ $\langle 0,0,4 \rangle$ $\langle 2,6,2 \rangle$ $\langle 3,2,2 \rangle$ $\langle 0,0,3 \rangle$ $\langle 6,4,4 \rangle$ $\langle 9,5,4 \rangle$

Assume that the size of the window is 20 and the size of the look-ahead buffer is 10.

6. [20 points]

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

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

Index	Entry
1	a
2	b
3	r
4	y
5	∅