

B.E. Information Technology Third Year First Semester Exam 2019

Subject: Multimedia Coding & Communications

Time: 3 hours

Full Marks: 100

Different parts under the same CO should be answered together.

- CO1
[25]
1. Explain different phases of multimedia presentation. [8]
Or
Briefly explain about multimedia authoring metaphor [8]
 2. Differentiate between the following terms: [6 x 2 = 12]
 - a. Multimedia vs Hypermedia
 - b. XML vs SMIL
 - c. Iconic Metaphor vs Frame Metaphor
 - d. Automatic Authoring vs Multimedia Authoring
 3. Write short note on MIDI Message [5]

- CO2
[35]
4. Illustrate the difference between following terms with example. [5]
 - a. Run length coding and Dictionary based coding
 5. Differentiate between variable length coding and fixed length coding. [3]
 6. Explain with example the Shannon-fano algorithm. [5]

Or

How arithmetic coding overcomes Huffman's problem? [5]
 7. Below is a grey scale image X where grey levels are ordered from 0 to 6. X is represented using the following matrix:

$$X = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 2 & 3 & 3 & 3 \\ 0 & 1 & 1 & 3 & 3 & 3 & 4 & 4 \\ 0 & 1 & 3 & 3 & 5 & 5 & 4 & 4 \\ 0 & 2 & 3 & 3 & 5 & 5 & 5 & 4 \\ 0 & 0 & 2 & 3 & 3 & 4 & 6 & 6 \\ 0 & 0 & 0 & 2 & 2 & 3 & 4 & 4 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Show the step by step execution of the Huffman coding to compress the image. Also, calculate the compression achieved using the Huffman coding. [10+2]

Or

Consider messages made up entirely of vowels (A, E, I, O, U). Here's a table of probabilities for each of the vowels:

I	p_I	$\log_2(1/p_I)$	$p_I \log_2(1/p_I)$
A	0.22	2.18	0.48
E	0.34	1.55	0.53
I	0.17	2.57	0.43
O	0.19	2.40	0.46
U	0.08	3.64	0.29
Totals	1.00	12.34	2.19

- a. Give an expression for the number of bits of information you receive when learning that a particular vowel is either I or U .
- b. Using Huffman's algorithm, construct a variable-length code assuming that each vowel is encoded individually. Please draw a diagram of the Huffman tree and give the encoding for each of the vowels.

- Encoding for A:
- Encoding for E:
- Encoding for I:
- Encoding for O:
- Encoding for U:

8. Execute encoding and decoding of the arithmetic coding on the symbol "CAEES" using the following probability distribution: [10]

Symbol	Probability	Range
A	0.2	[0, 0.2)
B	0.1	[0.2, 0.3)
C	0.2	[0.3, 0.5)
D	0.05	[0.5, 0.55)
E	0.3	[0.55, 0.85)
F	0.05	[0.85, 0.9)
\$	0.1	[0.9, 1.0)

CO3 [20]	9. What is rate distortion theory? Define distortion measure. Explain different distortion measures for lossy compression techniques. [3 + 2+ 7] 10. What is quantization? What are the different forms of quantization in lossy compression? [5 + 3]
CO4 [10]	11. Write short note on JPEG Image compression. [10] Or Explain about the JPEG bitstream and generation of bitstream. [10]
CO5 [10]	12. Explain different characteristics of multimedia data? What are the different parameters to determine the quality of service for multimedia data transmission, explain? Explain about Multimedia over IP. [2+5+3 = 10]