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06CS/IS663

Sixth Semester B.E. Degree Examination, June/July 2011
Data Compression

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. How the given code words are tested for unique decodability? Prove that the code : {0, 01,10} is not uniquely decodable. **(06 Marks)**

b. Explain any two performance metrics for data compression schemes. **(04 Marks)**

c. Design the Huffman code words for the alphabet $A=\{a_1, a_2, a_3, a_4, a_5\}$ with $P(a_1) = P(a_3) = 0.2$, $P(a_2) = 0.4$, and $P(a_4) = P(a_5) = 0.1$. Also draw the Huffman tree diagram. **(10 Marks)**

2 a. Explain the LZ77 compression scheme with an example for coding and decoding. **(10 Marks)**

b. Write and explain the algorithm used by CALIC to form the initial prediction. **(06 Marks)**

c. How multi resolution approach helps in progressive image transmission? **(04 Marks)**

3 a. Explain the various distortion criteria used in lossy compression schemes. **(04 Marks)**

b. What is quantization? Explain the uniform quantization with fixed length code words. Give an example. **(10 Marks)**

c. Explain the forward and backward quantization process. **(06 Marks)**

4 a. What is vector quantization? Explain the vector quantization procedure with a block diagram. **(08 Marks)**

b. With a block diagram, explain DPCM differential coding technique. Explain the role of predictor. **(08 Marks)**

c. Explain the drawbacks of delta modulation with a sketch. **(04 Marks)**

PART - B

5 a. What are linear systems? Explain the properties of a linear system. **(04 Marks)**

b. Define Nyquists sampling theorem. Explain the ideal sampling in the frequency domain. **(06 Marks)**

c. What are transforms? Explain DCT with suitable diagram. Mention its advantage. **(10 Marks)**

6 a. What are filters? Explain the ideal and realistic low pass filters. **(04 Marks)**

b. Explain the sub – band coding with the help of an 8 – band filter bank. **(08 Marks)**

c. Explain the MPEG Audio coding algorithm with a suitable diagram. Also explain the frame structure for layer I coding. **(08 Marks)**

7 a. What are wavelets? Explain its use in image compression, with a neat sketch. **(08 Marks)**

b. Explain embedded zero tree wavelet with a suitable diagram. **(08 Marks)**

c. Briefly explain the SPIHT scheme. **(04 Marks)**

8 a. With a neat diagram, explain H.261 video coding algorithm. **(08 Marks)**

b. Consider the following 4 × 4 image.

$$\begin{bmatrix} 110 & 218 & 116 & 112 \\ 108 & 210 & 110 & 114 \\ 110 & 218 & 210 & 112 \\ 112 & 108 & 110 & 116 \end{bmatrix}$$

Apply Loop filter of H.261 coding algorithm. **(06 Marks)**

c. Briefly explain the H.263 video compression with a block diagram. **(06 Marks)**