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Sixth Semester B.E. Degree Examination, June/July 2015
Data Compression

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. What is data compression? Explain different compression algorithms and their performance measurement. (06 Marks)
 - b. What are uniquely decodable codes? Give the procedure and determine whether following codes are uniquely decodable codes: i) {0, 01, 11} ii) {0, 01, 10}. (06 Marks)
 - c. A source emits letters from an alphabet $t = \{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1) = 0.15$, $P(a_2) = 0.04$, $P(a_3) = 0.26$, $P(a_4) = 0.05$ and $P(a_5) = 0.50$. Entropy = 1.818 bits. Calculate:
 - i) Huffman codes using minimum variance procedure; ii) Average length; iii) Redundancy. (08 Marks)
- 2
 - a. Given an initial dictionary consisting of letters entries (a, b, r, y, \backslash) with indices (1, 2, 3, 4, 5). Encode the following message using the LZW algorithm.
a \backslash b a r \backslash a r r a y \backslash b y \backslash b a r r a y a r \backslash b a y. (08 Marks)
 - b. Explain diagram coding techniques. (06 Marks)
 - c. Write a note on JPEG-LS standard. (06 Marks)
- 3
 - a. What is distortion? Explain the probability modes of lossy compression scheme with their shapes. (10 Marks)
 - b. Show that SNR of a uniform quantizer for uniformly distributed source is 6.02n dB. (06 Marks)
 - c. Discuss different ways to measure distortion. (04 Marks)
- 4
 - a. With a neat block diagram, explain vector quantization procedure. (08 Marks)
 - b. Give the LBG algorithm where inputs are not scalars and distribution is known. (06 Marks)
 - c. Illustrate with a graph, how the Constant Factor adaptive Delta Modulation (CFDM) works. (06 Marks)

PART – B

- 5
 - a. State linear system properties. (04 Marks)
 - b. Find the inverse Z-transform of $F(z) = \frac{6z^2 - 9z}{z^2 - 2.5z + 1}$. (06 Marks)
 - c. Define sampling theorem. Obtain inverse Fourier transform $f(t)$ in ideal sampling frequency domain view. (10 Marks)
- 6
 - a. Illustrate the basic subband coding algorithm with its block diagram. (10 Marks)
 - b. Explain application to speech coding G.722. (06 Marks)
 - c. Explain frame structure for layer-II coding in MPEG audio coding algorithm. (04 Marks)
- 7
 - a. Explain how wavelets are used in image compression, with a neat sketch. (10 Marks)
 - b. Discuss SPIHT scheme. (10 Marks)
- 8
 - a. What is motion compensation? Draw the block diagram of H.261 video coder and illustrate the roles of motion compensation and loop filter. (10 Marks)
 - b. Write a note on: i) Model-Based coding technique; ii) Video standard MPEG-2. (10 Marks)

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