Seat No. : _____

NE-130

December-2015

M.Sc., 5th Year (CA & IT)

Data Compression

Time : 3 Hours] **[Max. Marks : 100**

1. (a) Define Data Compression. Give examples of compressed data formats. **2**

   (b) Define any **eight** : **8**

   (i) Lossless Compression

   (ii) Lossy Compression

   (iii) Fidelity

   (iv) Modeling

   (v) Residual

   (vi) Entropy

   (vii) Unique Decodability

   (viii) Dangling suffix

   (ix) Coding

   (c) Check that code {0,01,11} or {0,01,10} which is one is unique decodable. Why ? **5**

   (d) Find entropy for source {A, B, C, D, E} for probability model P(A) = 0.31, P(B) = 0.24, P(C) = P(E) = 0.02, P(D) = 0.41. **5**

2. (a) Attempt any **two** : **10**

   (i) Find Golomb code for integers n = 0, 13 & 1 which is parameterized by m = 3

   (ii) Given the alphabet {A, C, N} with model F*x*(C) = 0.25, F*x*(A) = 0.501, F*x*(N) = 1 where F*x* is cumulative frequency of the symbol. Encode sequence "CAN" using Arithmetic coding with scaling and generate Tag (Binary conversion of Tag is not required).

   (iii) Find Minimum Variance Huffman coding for alphabet A={a_1, a_2, a_3, a_4, a_5} with probabilities P(a_1) = 0.5, P(a_3) = 0.05, P(a_5) = 0.25, P(a_2) = P(a_4) = 0.10.

(b) Attempt any **one :** **10**

(i) Given the alphabet {a, b,…., z} with size 26, encode the sequence "deeper" using Adaptive Huffman Coding.

(ii) Given the alphabet {a, b.... j, k, 1} with size 12, decode the sequence "000 101 001100 000 000 001 010 100 010 00" using Adaptive Huffman Coding.

3. Do as Directed :

(a) Decode the sequence 1 2 3 4 5 6 8 10 7 4 using LZW method with initial dictionary as 1-j, 2-o, 3-e, 4-y, 5-n **6**

(b) Give count array for –1, 0, 1 and 2 order context, for the sequence "neondon" to be encoded using PPM algorithm. **6**

(c) Encode sequence "e r r o r o r r o t o r" using LZ77 dictionary technique with search buffer and look ahead buffer size as 4. **4**

(d) Encode "queudequeque" using LZ78. **4**

4. Do as Directed :

(a) Explain any two probability models commonly used in the design and analysis of lossy compression system. **6**

(b) Explain any two Squared Error Measures of distortion. **6**

(c) Explain Rate Distortion Theory. **3**

(d) Explain "Silence Compression". **3**

(e) Explain Nyquist Theorem. According to Nyquist Theory, how to achieved superior Quality of sound. Explain with example. **2**

5. (a) Explain Midrise and Midtread quantizer. **2**

(b) Which Quantization is better ? Scalar or Vector ? Justify your answer. **2**

(c) Draw diagram of Vector Quantization Procedure. Why Vector quantization encoding requires more resources compared to decoding. **3**

(d) Quantize the sequence 1.3, 6, 3.45, 6.7, 2.9, 9.9 into a 3 level uniform quantizer. **3**

(e) What is quantization ? Write a note on uniform and non uniform quantization. **5**

(f) Explain Differential coding schemes. **5**

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