(c) Design a diagram codes for text files of interest to you.

(i) Explain the effect dictionary size and the size of the text file being encoded on the amount of compression.

(ii) Use the diagram coder on files that are not similar to the ones you used to design the diagram code. How much this affect your compression ?

5 Attempt any **two** of the following : **10×2=20**

(a) Explain the steps of the Linde-Buzo-Gray algorithm.

(b) What do you understand by predictive coding? Discuss multi resolution approaches.

(c) Discuss the Tree-structured Vector Quantizers.

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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0108 Roll No.

B. Tech.

(SEM. VII) EXAMINATION, 2008-09

DATA COMPRESSION

Time : 3 Hours] *[Total Marks : 100*

*Note : (1) Attempt **all** questions.*

*(2) Assume **data** wherever not provided.*

(3) Be precise in your answers.

1 Attempt any **four** of the following : **5×4=20**

(a) Explain compression and reconstruction with the help of block diagram.

(b) Based upon the requirements of reconstruction how data compression techniques are broadly classified? Explain these classifications in brief.

(c) Discuss the measures of performance of data compression algorithm.

(d) Comment upon the statement :

"Compression is still largely an art and to gain proficiency in an art you need to get a feel for the process."

(e) Explain redundancy that exists in the data and how it is related with the model.

(f) Explain Markov model.

2 Attempt any **four** of the following : 5×4=20

(a) Encode the following sequence of 16 values using the rice code with J=8 and one split sample option :

32, 33, 35, 39, 37, 38, 39, 40, 40, 40, 40, 39, 40, 40, 41, 40

for prediction use the previous value in the sequence $\hat{y}_i = y_{i-1}$

and assume a prediction of zero for the first element of the sequence.

(b) Explain Adaptive Huffman coding. How is it different from Conventional Huffman coding?

(c) What are the various applications of Huffman coding?

(d) For an alphabet A = $\{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1)=0.1$, $P(a_2)=0.3$, $P(a_3)=0.25$ and $P(a_4) = 0.35$.

(i) Calculate the entropy of this source

(ii) Find a Huffman code for this source

(iii) Find the average length of the code in (ii) and its redundancy.

(e) For an alphabet A = $\{a_1,a_2,a_3\}$ with probabilities $P(a_1)=0.7$, $P(a_2)=0.2$, $P(a_3)=0.1$ design a 3-bit Tunstall code.

(f) How do you achieve audio compression ? – Explain.

3 Attempt any **four** of the following : 5×4=20

(a) Given an initial dictionary consisting of the letter abry *b*, encode the following message using the LZW algorithm :

ab bar b array b by b barrayar b bay

(b) Discuss relative advantages of LZ 77, LZ 78 and LZW compression schemes.

(c) What are adaptive compression schemes? What is the basic difference between adaptive and statistical compression scheme? Discuss with model of adaptive compression.

(d) What are the differences between static length and variable length coding schemes? Why is Huffman compression called a variable length coding scheme?

(e) Give a brief comparison of MH, MR, MMR and JBIG.

(f) Differentiate between GIF image compression and JPEG image compression techniques.

4 Attempt any **two** of the following : 10×2=20

(a) What do you understand by Uniform Quantizer? How uniform quantization of a uniformly distributed sources and uniform quantization of nonuniform sources is done ?

(b) Design a 3-bit uniform quantizer (specify the decision boundaries and representation levels) for a source with a Laplacian pdf with a mean of 3 and a variances of 4