Bharatiya Vidya Bhavans'
Sardar Patel Institute Of Technology
Munshinagar, Andheri(W), Mumbai-400058

Subject : Foundation of Signal Processing Class : TE AIML

Assignment-5 Topic : Image Compression Date : 16-11-2023

Q(1) Find the arithmetic codeword of the message : I N D I A
Calculate the percentage of compression and Bits Per Pixel (BPP) of the compressed message.

Q(2) Given below is a table of eight symbol and their frequency of occurrence.

Symbol	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
Frequency	0.25	0.15	0.06	0.08	0.21	0.14	0.07	0.04

(a) Give Huffman code for each eight symbol.

(b) Evaluate minimum number of average bits of sequence per symbol.

(c) What is Coding Efficiency for the code you have obtained in part (a)?

Q(3) Find the Huffman code for the following stream of data (28 point)
{ 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 6, 7 }

Q(4) Given $F = \begin{bmatrix} 10 & 10 & 40 & 40 \\ 20 & 20 & 20 & 30 \\ 30 & 30 & 40 & 40 \\ 50 & 50 & 60 & 80 \end{bmatrix}$

Find DPCM Coded Image.

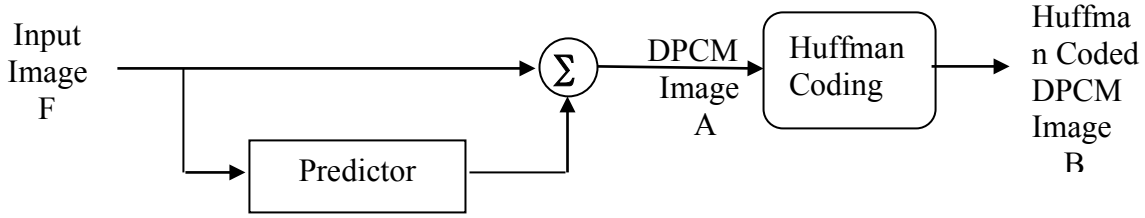
Q(5) Given $A = \begin{bmatrix} 10 & 0 & 30 & 0 \\ -20 & 0 & 0 & 10 \\ 0 & 0 & 10 & 0 \\ 10 & 0 & 10 & 20 \end{bmatrix}$

(a) Find Huffman Coded Image.

(b) Calculate Bits Per Pixel (BPP) and percentage of compression.

Q(6) Given $F = \begin{bmatrix} 10 & 10 & 40 & 40 \\ 20 & 20 & 20 & 30 \\ 30 & 30 & 40 & 40 \\ 50 & 50 & 60 & 80 \end{bmatrix}$

(a) Find Huffman Coded Image using the following Encoder.



(b) Calculate Bits Per Pixel (BPP) and percentage of compression. Do not consider the payload of Huffman table.

(Lossy)

Q(7) Given $F = \begin{bmatrix} 13 & 54 & 12 \\ 13 & 11 & 57 \\ 11 & 10 & 12 \end{bmatrix}$

(a) Find 3-bit IGS coded image and Calculate BPP & Compression factor.
(b) Find decoded image and Calculate MSE and PSNR.

Q(8) State TRUE or FALSE.

(a) All image compression technique are invertible.
(b) Runlength coding is lossless coding but may not give data compression always .
(c) Runlength coding always gives data compression. Justify your answer.
(d) Lossy compression is NOT suitable for compressing executable files.
(e) Variable length coding procedure can be used to compress a histogram equalized image with 2^n gray levels.
(f) Shrinking of an image is a lossy compression.
(g) Compression is possible only if the pixel values are occurring consecutively.
