Ministry of Higher Education
El-Shorouk Academy
Higher Institute for Computer & Information Technology

Department : Computer Sciences
Instructor : Dr. Abdellatief Hussein Abouali
Reviewer : Dr. Mohamed Elzewedy

Acad. Year : 2016 / 2017
Term : Second
Year : 4th
No. Questions : 3
Date : 24 /04 /2017
Time Allowed : 60 Min

4202 Multi-Media (Mid Term Exam)

Try all questions

Question 1 (3 points)

Clarify the following terms: - Sampling time interval, Entropy, Encoding algorithms classifications, Differential Encoding, SNR, and Huffman Encoding table.

Question 2 (20 points):

The following are gray counts taken from an image matrix (eight bit / pixel):-

Gray level	20	25	30	40	50	100	110	120	130	150	170	219
Gray count	10	150	1500	150	10	10	100	500	1000	400	50	20

Find out: The histogram and SNR after applying in-range uniform vector quantization to reduce the size to quarter of its original size. Assuming the former encoded image is compressed arithmetic each number represents a sequence of three, find out the decoded sequence of the binary number 0.010101, show the steps and make any assumption you may need clear. Is the SNR affected by the arithmetic encoding? If yes does it increase or decrease the value?

Question 3 (3 points):

Show how the following sequence will be compressed in steps and what will be the final outcome using LZW? Outline a program to perform the LZW compression process.
aaabbbcbbc
Compute the compression ratio assuming the symbols used are 8-bits and dictionary limited to 10-bit codes.
Decode the following sequence <66><65><256><257><258> of ASCII symbols. Giving the ASCII code 65 is 'A' and 97 is 'a'. Make any assumption you may need clear.

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Department : Computer Sciences
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Reviewers : Dr.Mohamed Elzewedy, Dr. Mohamed Hussen

Acad. Year : 2016 / 2017
Term : Second
Year : 4th
No. Questions : 4
Date : 25 /05 /2017
Time Allowed : 120 Min

4202 Multi-Media (Final Exam) (70 point)

Try all questions

Question 1 (20 points)

- Clarify the following terms: - Encoded multimedia file, Compression techniques classifications, arithmetic decoding, JPEG-encoding steps.
- Compare LZW with Huffman encoding.

Question 2 (20 points):

The following are gray counts taken from an image matrix:-

Gray level	15	25	35	40	65	150	160	220
Gray count	100	500	100	500	100	500	200	500

Find the Entropy. Find non-uniform code book of size 3. Show how the sequence 25, 150,160 will be represented. Compute the compression ratio and compare to entropy expected compression. Is there anything should be included in file header? If there what is it? and how it should be stored. Outline a decompression program for the case.

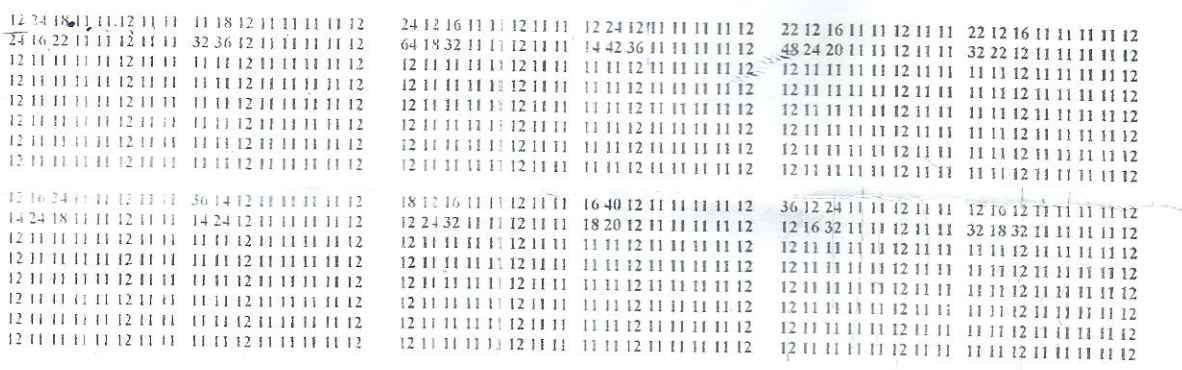
Question 3 (15 points):

(a) Show, how would you encode the following token using differential lossless : MULTIMEDIA2017 assume M=77, A=65,U=85,T=84,L=76,I=73, 1=49

(b) An analog signal has bandwidth ranges from 35 Hz to 53 Hz.
   a. Suggest a suitable sampling rate for such a signal
   b. Based on the suggested rate and the fact that the digitizer quantizes the output to 256 levels, what is the channel data-bandwidth that could deliver continuous operation of the digitizer?

(c) Write pixel packing compression algorithm.

Question 4 (15 points): (a, b, and c are considered independent)



R G B

a) Consider the above as an end of decompression iteration for a fractal compressed file using range block size 2 by 2. Then, find the values of the first range block of the next iteration. Giving the first block of the encoded file is [27, 4, 1, 2, 4] (The block format [position, orientation, scale, offset]). = 4050

b) Subtract the last two 8 by8 blocks (in the second row of blocks), consider the outcome as output of the quantization step of JPEG compression, and then use it to perform the next step.

c) Assume the above is an MCU RGB find out the value of the first pixel in YUV

GOOD LUCK