Register Number: …….

M.E DEGREE EXAMINATIONS: APR/ MAY 2010

Second Semester

COMMUNICATION SYSTEMS

COM505: Multimedia Compression Techniques

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:

PART A (10 x 2 = 20 Marks)

1. Differentiate lossy and lossless data compression.
2. What are the types of multimedia data?
3. What is “Run length encoding”.
4. List any two dictionary band methods.
5. What is MIDI?
6. What is G.722 standard?
7. What is sub band coding?
8. Explain the term “Optimal Quantization”
9. What is *Packet Video*?
10. State the difference between the H.261 and MPEG video compression standards?

PART B (5 x 16 = 80 Marks)

11 a) (i) Explain Taxonomy of compression techniques. (8)

(ii) Describe vector quantization with diagrams. (8)

(OR)

b) For each of the following media types, graphics, images, audio and the memory requirements in detail. Also justify the need for compression of each.

12 (a) Encode the following stream of characters using arithmetic coding:

MEDIA

You may assume that characters occur with probabilities of M = 0.1, E = 0.3, D = 0.3, I = 0.2 and A = 0.1. Also Decode the encoded output.

(OR)

(b) Explain the LZW family algorithms in detail with relevant example

13 (a) (i) What are the characteristics of speech signal? (6)

(ii) Explain how compression is achieved with A-law and μ-law companding. (10)

(OR)

(b) (i) How does MPEG audio compression exploit such phenomena? Give a schematic diagram of the MPEG audio perceptual encoder. (8)

(ii) What is meant by the terms *frequency* and *temporal masking* of two or more audio signals? Briefly, what is the cause of this masking? (8)

14 (a) Explain the predictive techniques in detail with examples.

(OR)

(b) (i) Compare JPEG and JPEG 2000 standards. (8)

(ii) Describe the SPIHT algorithm. (8)

15 (a) Given the following two frames of an input video show how MPEG would estimate the motion of the macroblock, highlighted in the first frame to the next frame.

1	1	1	1	1	1	1	1
1	1	2	3	3	2	1	1
1	1	2	2	2	2	1	1
1	1	2	**4**	**5**	2	1	1
1	1	2	**5**	**3**	2	1	1
1	1	2	3	3	2	1	1
1	1	1	3	3	2	1	1
1	1	1	3	3	1	1	1

Frame n

1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1
1	1	2	1	2	2	2	2
1	1	2	1	4	3	3	2
1	1	2	1	4	3	4	3
1	1	2	1	4	4	5	4
1	1	2	1	4	5	4	5
1	1	2	1	2	4	4	4

Frame n+1

For ease of computation in your solution: you may assume that all macroblock calculations may be performed over 4x4 windows. You may also restrict your search to ± 2 pixels in horizontal and vertical direction around the original macroblock.

(OR)

(b) (i) MPEG has a variety of different standards, i.e. MPEG-1, MPEG-2, MPEG-4, MPEG-7 and MPEG-21. Why have such standards evolved? Give an example target application for each variant of the MPEG standard. (8)

(ii) Write short notes on (8)

i) Block Matching

ii) Motion Estimation Methods

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