May 29, 2024   02:30 pm - 05:30 pm   1T01876 - T.E. Computer Science and Engineering (Artificial Intelligence and Machine Learning) (Choice Based) (R-19- 'C' Scheme)SEMESTER - VI / 37477 - Image & Video Processing (DLOC II)   QP CODE: 10056151

Duration: 3hrs   **[Max Marks: 80]**

N.B.:   (1) Question No 1 is Compulsory.
          (2) Attempt any three questions out of the remaining five.
          (3) All questions carry equal marks.
          (4) Assume suitable data, if required, and state it clearly.

1   Attempt **any FOUR**   **[20]**

   A   Justify or Contradict: Every image has a unique histogram

   B   Justify or Contradict: The zeroth (LSB) plane of the bit plane slicing contains
        high frequency information of the image.

   C   Justify or Contradict: Two fundamental characteristics of gray level values
        serve as the basis of segmentation algorithms for gray scale images.

   D   Justify or Contradict: Although run length coding is lossless, it may not always
        result in data compression.

   E   What is meant by Unitary Transform

2   A   Define i)4-adjacency ii) 8-adjacency iii)m-adjacency iv)City Block Distance   **[10]**
        (D4) v) Chess Board Distance (D8) vi)Euclidean Distance (De). Find D4, D8,
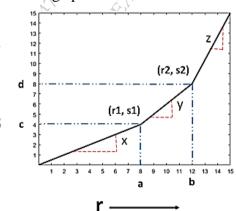   Dm, De distance between p & q. For Dm distance connectivity, set V={2,3,4 }

2(p)	4	5	3	4
5	3	2	4	5
7	6	2	1	5
6	5	3	4	0
4	5	7	2(q)	6

   B   Explain any five video file formats.   **[10]**

3   A   Derive Contrast Stretching Transformation function for given 4BPP image from   **[10]**
        the adjoining diagram. Modify given image pixel values.

B What is Image Transform? What is the significance of Image Transform? Write basis images of Walsh Hadamard Transform. **[10]**

4 A Explain IGS (Improved Gray Scale Quantization) compression with an example **[10]**

B Write derivation for Prewitt Edge detection operator. What is the advantage of a Prewitt operator? Compare Sobel & Prewitt edge operator. **[10]**

5 A Explain **Split & Merge Method** to find region similarity. **[10]**

For the following given image, find a homogeneous region using the following

Criteria **max[f(x,y)]-min[f(x,y)]<=3**

1	0	0	3	0	1	1	1
0	3	3	0	4	4	2	3
1	0	0	0	3	4	1	0
0	1	0	0	0	0	2	3
3	2	3	0	0	0	1	2
3	0	3	0	2	4	0	1
3	0	3	3	3	0	0	0
0	2	3	0	2	3	1	0

B Perform Huffman Encoding on given data. Calculate average word-length, and compression ratio. **[10]**

Character	a	b	c	d	e	f
Frequency	5	9	12	13	16	45

6 A For a given 1D and 2D signal, apply the Walsh Transform to convert the signal from spatial domain to frequency domain. **[10]**

1D signal x={5,8,4,2}

2 D Signal

y=

0	1	2	1
1	2	3	2
2	3	4	3
1	2	3	2

B List and explain any four Zero Memory Operations with a diagram representation and equation. Also explain why are they called as Zero Memory Operations **[10]**

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