05SCS143

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NEW SCHEME

First Semester M.Tech. Degree Examination, June 2007
Digital Image Processing & Computer Vision

Time: 3 hrs.]   [Max. Marks:100

Note : *Answer any FIVE full questions.*

1   a. What are the various components involved in a general image processing system? Explain with relevant schematic block diagram. **(10 Marks)**
    b. With the basic formulation, explain how edge detection can be achieved using derivatives. **(10 Marks)**

2   a. Explain the concept of zooming and shrinking in digital images. **(08 Marks)**
    b. It is required to transmit data in the form of packets consisting of a start bit, a byte of information and a stop bit. Calculate the time required to transmit 1024×1024 image with 256 gray levels using 56 k baud modem. Also, what would be the time at 750 k baud? **(07 Marks)**
    c. Consider the image segment shown in Fig.2(c). Let $V = \{0, 1\}$. Compute the length of shortest 4, 8 and 'm' path between 'p' and 'q'.

$$
\begin{array}{cccc}
3 & 1 & 2 & 1\ (q) \\
2 & 2 & 0 & 2 \\
1 & 2 & 1 & 1 \\
(p)\ 1 & 0 & 1 & 2
\end{array}
$$

Fig.2(c)   **(05 Marks)**

3   a. An 8-level image has gray level distribution shown in table below. r_K indicates gray level of image.

K	0	1	2	3	4	5	6	7
r_K	0	$1/7$	$2/7$	$3/7$	$4/7$	$5/7$	$6/7$	1
n_K	327	901	573	574	410	204	942	165

      i) Draw histogram of original image.
      ii) Draw histogram based on histogram equalization. **(10 Marks)**
    b. What are smoothing spatial filters? Explain how noise reduction can be accomplished using these filters. **(10 Marks)**

4   a. Explain any four important 2-dimensional properties of Fourier transforms. **(12 Marks)**
    b. With neat block diagram and relevant equations, explain the homorphic approach for image enhancement. **(08 Marks)**

5   a. What are the various probability density functions used in image processing applications? Explain any two. **(10 Marks)**

      b. Derive an expression for mean square error for Wiener filter. **(10 Marks)**

6   a. What do you mean by pseudo color image processing? Explain with transform function, the process of gray level to color transformation. **(10 Marks)**

      b. With neat block diagram, explain the pyramidal image structure. **(10 Marks)**

7   a. What is lossy and lossless compression? Explain lossy predictive coding with a neat block diagram. **(10 Marks)**

      b. Assume eight input encoder a_i , i = 1, 2, ... 8 with probabilities 0.05, 0.008, 0.022, 0.06, 0.18, 0.13, 0.07, 0.48.
   i) Construct Huffmann code
   ii) Find average word length
   iii) Compute entropy. **(10 Marks)**

8   a. Explain the segmentation techniques used in region finding. **(10 Marks)**

      b. Write a note on recognition based decision theoretic methods. **(10 Marks)**

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