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17EC72

Seventh Semester B.E. Degree Examination, July/August 2021
Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Draw the block diagram of General Purpose image processing system and explain it.
 (08 Marks)
 b. Explain the process of image sampling and quantization. **(08 Marks)**
 c. Let p and q are pixels at co-ordinates (10, 12) and (15, 20) respectively. Find the which distance measure gives minimum distance between them. **(04 Marks)**

2 a. Discuss the relationship between pixels in details. **(08 Marks)**
 b. Consider the image segment,

$$
\begin{array}{ccccc}
3 & 1 & 2 & ① & q \\
2 & 2 & 0 & 2 & \\
1 & 2 & 1 & 1 & \\
p & ① & 0 & 1 & 1
\end{array}
$$

 Let V = [0, 1], compute the length of 4, 8 and M path between p and q. If a particular path does not exist between p and q explain why? **(08 Marks)**
 c. Mention the applications of image. **(04 Marks)**

3 a. Explain the following intensity transformation functions:
   (i) Image negatives.
   (ii) Log transformation.
   (iii) Power law transformation. **(12 Marks)**
 b. Explain Bit plane slicing with example. **(08 Marks)**

4 a. With the block diagram, and mathematical equations, explain Homomorphic filtering.
 (10 Marks)
 b. Explain the Butterworth LPF and Gaussian LPF for image smoothing. **(10 Marks)**

5 a. Discuss the most commonly used noise probability density functions in image processing applications. **(10 Marks)**
 b. Explain the following techniques used for noise removal in image processing:
   (i) Arithmetic mean filter. (ii) Median filter **(10 Marks)**

6 a. Explain the followings for periodic noise reduction:
   (i) Band rejection filters.
   (ii) Band pass filters. **(10 Marks)**
 b. Discuss the three principal way to estimate the degradation function for use in image restoration. **(10 Marks)**

7 a. Discuss the following color models:
   (i) RGB color model.
   (ii) CMY model.
   (iii) HSI model **(15 Marks)**

 b. Given RGB = (0.683, 0.1608, 0.1922) convert this to HSI model. **(05 Marks)**

8 a. Draw the block diagram of pseudo color processing and explain it. **(08 Marks)**
   b. Explain two dimensional four band filter band for subband image coding. **(08 Marks)**
   c. What is duality of a morphological image processing? **(04 Marks)**

9 a. Explain the following of image segmentation:
       (i)   Line detection
       (ii)   Edge detection. **(12 Marks)**
   b. Explain region Splitting and Merging. **(08 Marks)**

10 a. Explain the chain codes used to represent a boundary. **(08 Marks)**
   b. Write the Otsu's algorithm used for optimum global thresholding. **(08 Marks)**
   c. What is skeletons? **(04 Marks)**

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