Question Paper

Exam Date & Time: 10-Feb-2021 (10:00 AM - 01:15 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

MANIPAL SCHOOL OF INFORMATION SCIENCES, MANIPAL
FIRST SEMESTER MASTER OF ENGINEERING - ME (HEALTHCARE DATA ANALYTICS) DEGREE EXAMINATION - FEBRUARY 2021

Digital Image Processing [HDA 602]

Marks: 100 **Duration: 180 mins.**

WEDNESDAY, FEBRUARY 10, 2021

Answer all the questions.

1) Explain the arithmetic and logical operations for image processing and describe how it affects the appearance of the image. (10)
(TLO 1, L2) (10 marks)

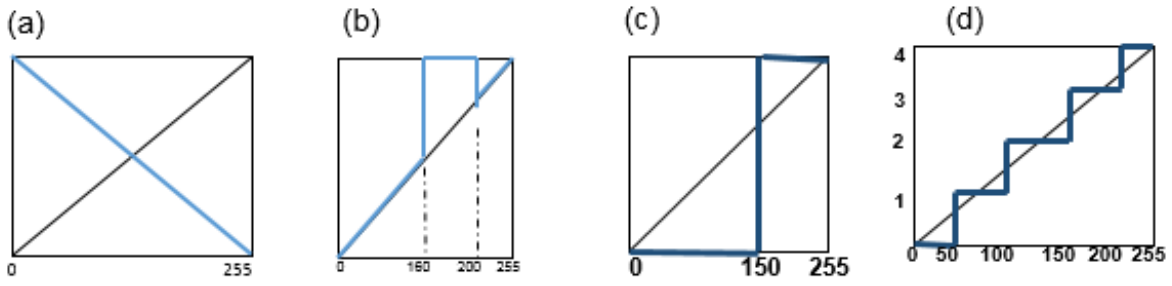
2) What are histograms? How are they helpful in describing the quality of an image? Explain what is meant by histogram equalization? Illustrate the use of histogram equalization to enhance the quality of an image? (10)
(TLO 1, L5) (2+3+3+2 marks)

3) What is a derivative filter? Explain first and second order derivative filters. Name one example of each type of filter. (10)
(TLO 1, L2) (2+6+2 marks)

4) Pixel values of an image I are listed as below (TLO 1, L4) (4x2.5 marks) (10)

75	81	101	121	177	179
109	151	111	120	189	190
102	158	161	180	152	155
179	178	180	181	182	151
10	24	210	182	232	252
10	43	212	180	241	251

Identify the resultant matrices for the operations represented by the following transfer functions on the image I.



5) Explain Region splitting and merging algorithm and illustrate it with the help of an example. (10)
(TLO 2, L4) (10 marks)

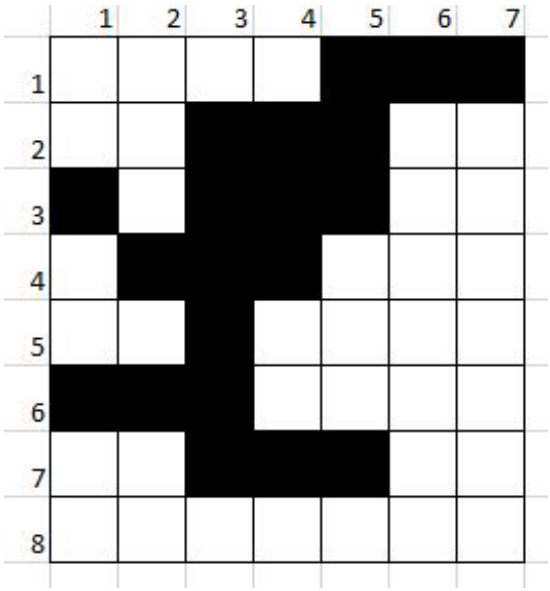
6) Describe the use of morphological operators for image processing with the help of an example. Also (10)

apply them for boundary extraction.
(TLO 2, L4) (6 +4 marks)

7) Explain K Means clustering algorithm and demonstrate it with the help of an example. (10)
(TLO 2, L4) (10 marks)

8) Describe Gray level co-occurrence matrix. How can GLCM be used for obtaining 'contrast' and 'homogeneity' of an image. For the image given by the following matrix, evaluate its GLCM with d=1, θ=0. (TLO 3, L5) (2+ 4+ 4 marks) (10)

9) What are moments? How moments can be used to obtain area and centroid of an object? Evaluate the area and centroid of the object marked black in the following image. (TLO 3, L5) (1+4+5 marks) (10)



10) Describe the following classifiers. (i) Nearest neighbor classifier (ii) Linear Discriminant classifier (10)
(TLO 3, L2) (5+5 marks)

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