Exam Date & Time: 25-Aug-2023 (03:15 PM - 04:15 PM)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

Faculty of Technology and Engineering
Department of Computer Science and Engineering

Unit Test-1

Semester: 7th Sem B. Tech. (CSE)
Maximum Marks: 30
Date: 25/08/2023 (Friday)
Time: 3.15PM to 4.15PM

Image Processing And Computer Vision [CS474]

Marks: 30 **Duration: 60 mins.**

I_MCQs

Answer all the questions.

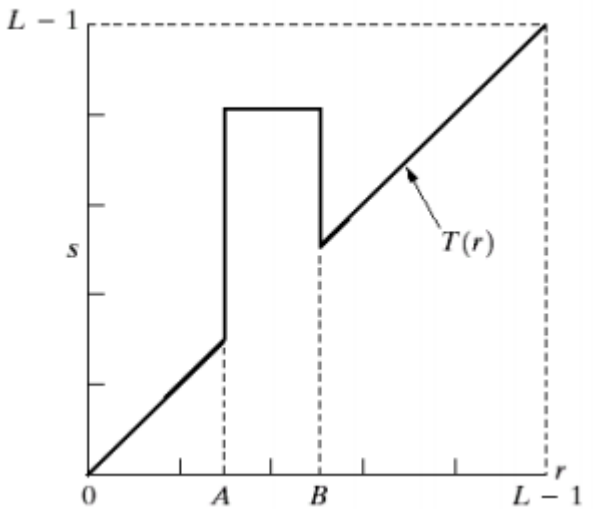
1 Consider a 8-bit gray scale image with dimension 5 × 5.
What will be possible range of values comprised by pixels in thisimage? (1)

1) 0 to 7 2) 1 to 256 3) 0 to 255 4) 1 to 8

2 Which of the following is vector graphics-image format? (1)

1) BMP 2) SVG 3) JPEG 4) PNG

3 Consider r is intensity of input image and s is intensity of output image, Which point processing imageenhancement operation is represented in following transformationfunction? (1)



1) Gray Level Slicing 2) Image Negative 3) Thresholding 4) Contrast Stretching

4 Which of the following spatial filter is optimum choice to removesalt and pepper noise from images? (1)

1) Low Pass Filter 2) High Pass Filter 3) Max FIilter 4) Median Filter

5 Which 2D transformation is represented by given matrixoperation? (1)

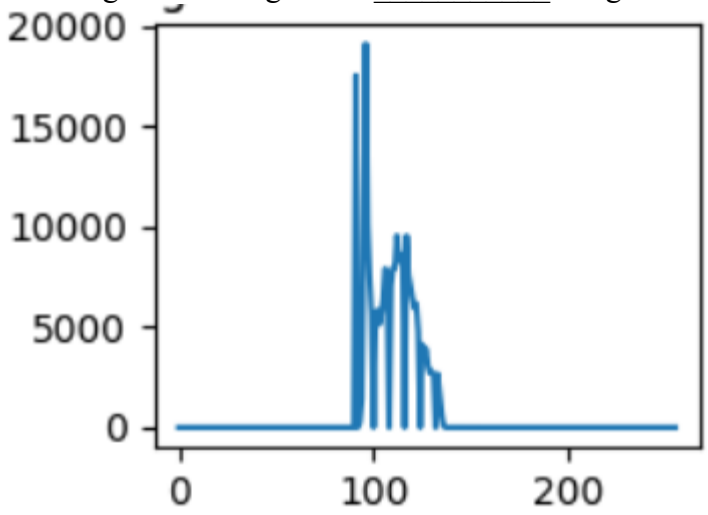
$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

1) Translation 2) Scaling 3) Rotation 4) Shearing

6 Which of the following is FALSE for vanishing points? (1)

1) Perspective Projection never produces vanishing points. 2) Orthographic Projection never produces vanishing points. 3) It is projection of a point at infinity. 4) The ray from COP through vanishing point is parallel to the lines which are projected at vanishing point.

7 Following is the histogram of _____ image: (1)



1) Dark Image 2) Light Image 3) Low Contrast Image 4) High Contrast Image

8 Which filter is used in canny edge detection? (1)

1) Median 2) Derivative of 3) Laplacian 4) Homomorphic

Filter Gaussian Filter Filter Filter

9 Which of the following statement is FALSE for Watershed algorithm?

1) Watershed algorithm can lead to over-segmentation of images.
2) Watershed algorithm associates a unique region with each local minimum.
3) Watershed algorithm is often part of interactive system,where user first marks seed locations that correspond to centers of the desired segments.
4) Watershed algorithm associates a unique region with reference to global minimum.

(1)

10 Consider the following 3-bit gray scale image:

1	1	2	3
4	***5***	6	7
3	6	5	4
0	1	0	7

(1)

Which of the following can be values when vertical Sobel operatoris applied on BOLD, Italic pixel with value 5?

1) 7 2) 9 3) 8 4) 6

II_Descriptive

Answer 4 out of 7 questions.

11 Draw and explain digital image acquisition process (sampling andquantization) with an example image. (5)

12 Find out the direction of principal axis and location of principalpoint of the camera with projection matrix P =

$$\begin{bmatrix} 51 & 6 & -18 & 10 \\ -23 & 5 & 9 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix}$$

(5)

13 Perform Histogram equalization on image with following details:

(5)

Gray level (r_k)	Number of pixels (n_k)
0	790
1	1023
2	850
3	656
4	329
5	245
6	122
7	81

14 Consider given 3-bit grayscale input image:

2	7	1
3	5	4
2	6	1

(5)

Apply i. 3×3 Spatial Low Pass Filter (Averaging Box Filter)

and ii. 3×3 Spatial Median Filter

on given input image and generate output images while presentingsteps of calculations. (Note: Use Zero padding when required)

15 Draw and explain Canny edge detection algorithm. (5)

16 Find out threshold value using Otsu's method for given 3×3 image:

154	138	163
75	74	151
70	106	118

(5)

17 Explain i. Contrast Stretching and ii. Gamma Correction (Power LawTransformation) using examples. (5)

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