GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
IMAGE PROCESSING AND PATTERN RECOGNITION
MCE204C

TIME ALLOTTED: 3 Hrs   **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)
Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1.	(i)	An image is considered to be a function of a(x, y) where a represents a. Height of image b. width of image c. amplitude of image d. resolution of image	1	CO1
	(ii)	The initial step in any image processing technique is a. segmentation b. masking c. image acquisition d. normalization	1	CO2
	(iii)	Intensity range of grayscale image is a. 0 to 7 b. 0 to 15 c. 0 to 31 d. 0 to 255	1	CO2
	(iv)	Which is the image processing technique used to improve the quality of image for human viewing? a. Compression b. Enhancement c. Restoration d. Analysis	1	CO3
	(v)	Among the following image processing techniques which is fast, precise and flexible a. Optical b. Digital c. Electronic d. Photographic	1	CO3
	(vi)	Image compression is similar to a. making image look better b. sharpening the intensity-transition regions c. minimizing degradation over image d. reducing the redundancy of the image data	1	CO4

(vii)	The process of extracting information from the image is called as a. Image enhancement b. Image restoration c. Image Analysis d. Image compression	1	CO3
(viii)	A pixel p at coordinates (x, y) has four horizontal and vertical neighbours whose coordinates are given by a. $(x - 1, y - 1), (x - 1, y), (x, y - 1), (x, y + 1)$ b. $(x + 1, y), (x - 1, y), (x, y + 1), (x, y - 1)$ c. $(x + 1, y - 1), (x - 1, y), (x - 1, y + 1), (x, y + 1)$ d. $(x + 1, y), (x + 1, y - 1), (x, y + 1), (x - 1, y + 1)$	1	CO2
(ix)	In which technique which is used to determine changes between two images ? a. Image differencing b. segmentation c. skin texture analysis d. image averaging	1	CO3
(x)	Training & testing data distribution for a learning task is a. 50% -50% b. 70% -30% c. 30% -70% d. Depends on dataset	1	CO5
(xi)	Supervised and unsupervised learning uses a. Labeled data and unlabeled data respectively b. Unlabeled data and Labeled data respectively c. Both Labeled data d. Both Unlabeled data	1	CO5
(xii)	An image function f(x, y) is characterized by $f(x, y) = i(x, y)r(x, y)$ where a. $0 < i(x, y) < 1$ & $0 < r(x, y) < \infty$ b. $0 < i(x, y) < 1$ & $0 < r(x, y) < 1$ c. $0 < i(x, y) < \infty$ & $0 < r(x, y) < \infty$ d. $0 < i(x, y) < \infty$ & $0 < r(x, y) < 1$	1	CO1

GROUP – B
(Short Answer Type Questions)
Answer any three from the following: 3×5=15

		Marks	CO No
2.	What do you mean by Digital Image Processing? Discuss different Application areas of Digital image processing?	5	CO1
3.	Define pattern recognition. State some applications of pattern recognition.	5	CO5
4.	Why image compression is required? What is the difference between lossy and loss less compression?	5	CO4
5.	Mention different edge detection operators and compare them.	5	CO3

6. From the confusion matrix shown below determine accuracy, precision, recall and F-measure.   5   CO5

n=165	Predicted: NO	Predicted: YES	
Actual: NO	TN = 50	FP = 10	60
Actual: YES	FN = 5	TP = 100	105
	55	110	

GROUP – C
(Long Answer Type Questions)
Answer any three from the following: 3×15=45

			Marks	CO No
7.	(a)	Explain the fundamental steps in Digital Image Processing.	5	CO1
	(b)	Define the following terms with respect to a digital image. i) Resolution of an image, ii) Image negative	4	CO1
	(c)	What is histogram processing? Explain histogram equalization technique.	6	CO2
8.	(a)	What is an "edge" in an image? What is the difference between an "edge" and a "line" in an image?	3	CO3
	(b)	Describe edge detection algorithm using gradient operator	5	CO3
	(c)	What is image segmentation? What are the applications of image segmentation? Explain region splitting and merging technique for image segmentation.	7	CO3
9.	(a)	Compare supervised and unsupervised learning with examples.	5	CO5
	(b)	Explain Naïve Bayesian classification.	5	CO5
	(c)	Explain Wavelet Transform with applications.	5	CO5
10.	(a)	Explain the comparison between classification and clustering with examples	5	CO5
	(b)	Explain the steps required for image-based signature verification	10	CO5
11.		Write Short notes on any three of the following	3x5=15	
	(a)	Contrast and Brightness of an image	5	CO3
	(b)	Different types of colour models for digital image	5	CO2
	(c)	Region based segmentation	5	CO4
	(d)	Bit Plane Slicing	5	CO1
	(e)	Merits and demerits of the BMP and JPEG image file format.	5	CO2