Total number of printed pages: 50

Programme(UG)/7th/UCSE715

2023

Digital Image Processing

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	**Answer the following questions:**		
	a)	**Fill in the blanks:**	**1x5=5**
		(i) Periodic noise occurs due to _____. **(ii)** Addition of noisy images helps in _____. **(iii)** Image registration is to use _____ for the corresponding points in both input and output (reference) images. **(iv)** _____ filter is used to handle only salt noise, but not pepper noise. **(v)** _____ coding is used for spatial redundancies in an image.	
	b)	**True or False:**	**1.5x10= 15**
		(i) Erosion increases a region. **(ii)** A grey level transformations *S=C log (1+r)* produces image negative. **(iii)** Poor illumination introduces Gaussian noise. **(iv)** If the image is degraded by motion blur and added noise then median filter gives the best result. **(v)** The relation of intensity (I) and R, G & B in RGB colour model is I=(R+G+B)/3. **(vi)** Pseudo color is similar to as false color. **(vii)** Color complement of Magneta is cyan color. **(viii)** Tonal correction can be done by adjusting brightness and contrast. **(ix)** Huffman coding is not used for removing coding redundancy. **(x)** Color image smoothing is done by per-color plane method.	
2.	**a)**	Compute the Euclidean Distance (D1), City-block Distance (D2) and Chessboard distance (D3) for points x and y, where x and y be (6, 3) and (2, 6) respectively. Give answer in the form (D1, D2, D3).	**6**
	b)	What is the importance of low-level and mid-level stage in image processing	**3**
	c)	How many bits are required to store digitized image dimension is (64*64) and intensity interval (0-63)?	**3**
	d)	What is pixel? Explain 4-neighbour and 8-neighbour of a pixel. Explain m-adjacency.	**4**
	e)	Explain the following Basic Intensity Transformation with a diagram: i) Image Negatives ii) Log Transformations	**4**
3.	**a)**	Draw a model of image Degradation/Restoration Process and discuss it in short.	**5**
	b)	What are the different types of noise sources?	**3**

	c)	What is adaptive filter?	**4**
	d)	Mention the masks used for point and line detection.	**5**
	e)	What is canny edge detector?	**3**
4.	**a)**	Explain how color images are represented using HSI color space model.	**3**
	b)	Write the conversion rules for converting RGB colour model to HSI colour model and from HSI to RGB.	**6**
	c)	Describe the different types of recognition based on decision-theoretic methods.	**6**
	d)	Describe Boundary descriptors with respect to Shape Number	**5**
5.	Write short notes on the following (***any four***):		**4x5=20**
	a)	Image gradient	
	b)	Histogram equalization	
	c)	Spatial filtering	
	d)	Syntactic Recognition of Strings (Structural Methods)	
	e)	Different types of image formats (full forms)	
6.	Differentiate between the following (***any four***):		**4x5=20**
	a)	Image enhancement and Image restoration	
	b)	Vector and string pattern classes	
	c)	Coding redundancy and spatial redundancy	
	d)	Sampling and Quantization	
	e)	Sharpening and Smoothing filter	