U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

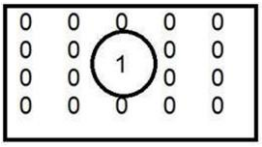
Autonomous Institute Affiliated to VTU

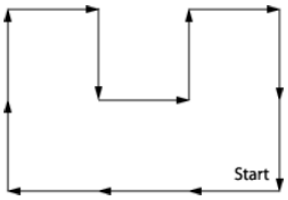
October 2024 Supplementary Examinations

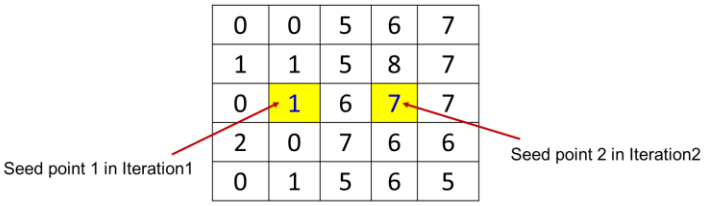
Programme: B.E. **Semester: VI**
Branch: Medical Electronics Engineering **Duration: 3 hrs.**
Course Code: 22MD6PCMIP **Max Marks: 100**
Course: MEDICAL IMAGE PROCESSING

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	CO	PO	Marks
1	a)	What will be the image file size for image having 576 rows, 768 columns and 256 gray levels? How many minutes would it take to transmit this image using a baud rate of 2400bits/sec?	CO1	PO1	**04**
	b)	Consider the image segment shown below. Let V= {10, 11, 12}. Identify the shortest 4, 8 and m- path between pixels p and q and the path lengths. 14 14 11 12 10 10 11 10 14 12 (q) 10 12 13 11 14 10 (p) 13 14 14 11	CO1	PO1	**06**
	c)	Let p and q are two pixels with spatial locations as (100,120) and (130,160) respectively. Compute i. Chess board distance ii. Manhattan distance	CO1	PO1	**04**
	d)	Covert pixel values RGB(29,104,215) to HSI giving relevant equations . What is need of converting image data to different color models?	CO1	PO1	**06**
		UNIT-II			
2	a)	Compute the new pixel values after performing Log transformation and Gamma correction on the below given image data. Explain the purpose of using these transformations. 15 29 40 8 201 215 210 58 178 169 150 230	CO2	PO1	**07**

	b)	It is required to compress 4 bit retinal image based on the binarization results. Which algorithm is best suited for this purpose? Encode the image data given below considering contribution by specific bits. 15 15 9 10 11 6 9 4 9 12 15 7 1 3 5 5 1 11 8 2 13 14 6 6	*CO2*	*PO1*	**07**
	c)	Which image sharpening filter is isotropic in nature? Explain why?	*CO2*	*PO1*	**06**
		OR			
3	a)	How will you perform edge enhancement through image smoothing? Discuss the steps in the algorithm.	*CO2*	*PO1*	**07**
	b)	Using suitable image enhancement algorithm how can you encode the below given image data? Discuss the objectives of this algorithm. 16 10 50 100 5 64 150 211 54 100 88 33 76 77 46 36	*CO2*	*PO1*	**07**
	c)	What will be new pixel values for the underlined pixels when 3x3 filter is used to remove salt and pepper noise from the given image data. 18 22 33 25 32 24 34 **128** 24 **172** 26 23 22 19 32 31 28 26	*CO2*	*PO1*	**06**
		UNIT - III			
4	a)	How will you reduce multiplicative noise and enhance reflectance for a medical image captured in low ambient light. Discuss the algorithm and elaborate how illumination correction is achieved through the proposed algorithm.	*CO2*	*PO1*	**10**
	b)	Identify the filter reprsented and discuss its performance in performing image enhancement .  	*CO2*	*PO1*	**10**
		UNIT - IV			
5	a)	Discuss how image restoration is different from enhancement. Also represent and discuss the image restoration model.	*CO2*	*PO2*	**05**

	b)	Consider the image segment given below. What will be the new pixel values of underlined pixels if Alpha trimmed mean filter of size 3x3 is used in image restoration process? Assume d = 4. 21 34 78 214 56 8 32 **214** **90** **210** **67** 45 23 45 44 3 41 255 82 32 211 66 201 5	*CO1*	*PO1*	**08**
	c)	Exemplify the operation of following filters used for image restoration i. Geometric mean filter ii. Contra harmonic mean filter	*CO2*	*PO1*	**07**
		UNIT - V			
6	a)	Apply the thresholding method based on minimizing within group variance to find the best value of the threshold for segmentation of the following image data. Assume, in the first pass threshold value is 3 and in second pass it is changed to 4. Comment on the results obtained. What could be the disadvantage of this method? Gray Level Value: 0 1 2 3 4 5 No. of pixels: 8 7 2 6 9 4	*CO2*	*PO1*	**10**
	b)	Identify 4 directional and 8 directional Chain Code and compute shape number for the following image. Analyze the effect of change in start point on shape number?  	*CO2*	*PO1*	**10**
		OR			
7	a)	Analyze what will be the output image if Quad tree algorithms is implemented on the below given image data. Discuss the steps in this algorithm. Splitting is to be performed if the difference between the gray level values is greater than 1. 0 1 0 0 7 7 7 7 1 0 2 2 7 7 7 7 0 2 2 2 7 7 7 7 4 4 2 2 7 7 7 7 0 0 1 1 3 3 7 7 1 1 2 2 3 7 7 7 2 4 3 0 5 7 7 7 2 3 3 5 5 0 7 7	*CO2*	*PO1*	**10**

		b)	Discuss the steps of Region Growing image segmentation algorithm. Implement it to segment the given image for mentioned seed point. Assume 8 connectivity, similarity criteria is the gray level difference. Find segmented image if T>=3 initially and later If T>=5 	*CO2*	*PO1*	**10**

0	0	5	6	7
1	1	5	8	7
0	1	6	7	7
2	0	7	6	6
0	1	5	6	5

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