Reg. No.



II SEMESTER M.TECH. (COMPUTER SCIENCE AND ENGINEERING) END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: DIGITAL IMAGE AND VIDEO ANALYSIS [CSE 5237]

REVISED CREDIT SYSTEM (25/04/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- 1A. Explain the various spatial domain filters based on first and second order 3 derivatives
- 1B. Define 4 adjacency, 8 adjacency and m adjacency. Consider the two image subsets, S₁ and S₂ shown in the Fig.Q1B. For V= {1}, determine whether these two subsets are (i) 4-adjacent, (ii) 8-adjacent and (iii) m-adjacent. Justify your answer



- Suppose that a digital image is subjected to histogram equalization. With proper mathematical expressions show that a second pass of histogram equalization (on the histogram equalized image) will produce exactly the 2 same result as the first pass.
- **1D.** Prove the validity of the following equations. F() represents Fourier transform and $F^*()$ represents the complex conjugate of F()
 - (i)

$$f(x,y)e^{j2\pi(u_0x+v_0y)} = F(u-u_0,v-v_0).$$

(ii) If f(x,y) is imaginary

$$F^*(-u-v) = -F(u,v)$$

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2A. 2B.	Derive an expression for between class variance of an image and hence show how it can be used to obtain the optimal threshold for segmentation. Consider PDFs of object and background as Gaussian. Explain the following noise reduction filters and also indicate what type of page is removed by each of these filters.	5
	(i) Harmonic Mean Filter (ii) Max and Min Filter	3
2C.	Explain the ideal low pass and high pass frequency domain filters, along with their transfer functions.	2
3A.	Explain the following approaches (i) Variable thresholding based on Moving averages (ii) Marr Hildreth Edge Detector	4
3B.	Explain opening and closing operations and list the properties that the opening and closing operations have to satisfy.	3
3C.	Explain the following Gray Scale Morphological Algorithms. (i) Morphological Smoothing (ii) Morphological Gradient	
	(iii) Top Hat and Bottom Hat Transformation	3
4A.	Explain how active contour models could be used in segmentation of images	4
4B.	Explain how chain codes are used to represent the boundaries. How is the	

4B. Explain how chain codes are used to represent the boundaries. How is the dependency on starting point and rotation removed? For the figure given in Fig. Q 4 B, write the chain code and also the chain code normalized with respect to starting point and rotation.

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Fig. Q 4.B.

- 4C. What are regional descriptors? Give examples
- 5A. Explain the operation of the following filters used for video enhancement. Mention the disadvantage of these filters
 - (i) Temporally Averaging Filters
 - (ii) Spatiotemporal filters
- **5B.** What are blotches? With a neat block diagram, explain the various components in the Blotch Detection and Removal System. ³
- 5C. Explain the Frame difference image analysis technique for motion detection.What are drawbacks of this technique?

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