SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

Mode of Exam
OFFLINE

DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

SET - A

Academic Year: 2023-24 (ODD)

Test: CLAT-2 **Date:** 09-010-2023
Course Code & Title: 18AIE332T – Image and Video Processing **Duration:** 1 Hour
Year & Sem: III Year & V Semester **Max. Marks:** 50 Marks

Course Articulation Matrix:

Course Learning Outcomes (CO):	*At the end of this course, learners will be able to:*
CO-1	*Illustrate the basic concepts of Swarm Intelligence processes*
CO-2	*Examine the principle of Immuno computing techniques*
CO-3	*Skills for planning, estimating, and resourcing for Natural design considerations*
CO-4	*Manage the scope changes of nature inspired techniques which influence computing*
CO-5	*Ability to identify optimization Techniques as a means to provide functionality and value to apply context in specific case studies*
CO-6	*Ability to understand the needs and familiarize the DNA Computing*

1	2	3	4	5	6	7	8	9	10	11	12	PSO		
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual &Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
2	*3*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	*1*
3	*3*	*1*	*2*	*2*	-	-	-	-	-	-	-	-	-	*2*
3	*3*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	*2*
3	*3*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	*2*
3	*3*	*2*	*2*	*2*	-	-	-	-	-	-	-	-	-	*3*
2	*3*	*2*	*2*	*2*	-	-	-	-	-	-	-	-	-	*3*

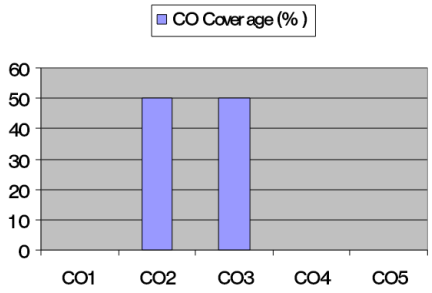
Part – A
(5 x 1 = 5 Marks)

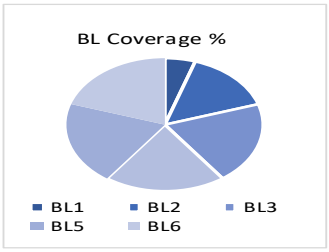
Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Which spatial domain technique would you use to improve the contrast of a grayscale handwritten digit image for optical character recognition (OCR) by redistributing the intensity values across the entire range? a) Histogram Processing b) Histogram Equalization c) Histogram Matching d) Local Histogram Processing	**1**	**2**	**2**	**1**	**1.2.4**
2	To restore the image and reduce the impact of noise, which common spatial domain method would you employ? a) Inverse Filtering – Wiener b) Singular Value Decomposition c) Adaptive Filters d) Band Pass Filters	**1**	**1**	**2**	**1**	**1.2.2**
3	A project that requires identifying and isolating individual cells in microscopic images. Which segmentation	**1**	**1**	**3**	**1**	**2.1.3**

	technique would you use? a) Detection of Isolated Points b) Region Splitting and Merging c) Line Detection d) Region Growing					
4	Choose the compression technique that is most suitable for efficiently representing consecutive occurrences of the same value with a code indicating the value and its count in a data compression algorithm designed for a sensor data stream? a) Run Length Coding b) Bit Plane Coding c) LZW Coding d) Arithmetic Coding	**1**	**2**	**3**	**1**	**2.4.2**
5	What compression technique, recognized for its ability to efficiently reduce both spatial and spectral redundancies in hyperspectral satellite images, would you utilize to optimize storage and transmission of these images? a) Wavelet Coding b) Predictive Coding c) Bit Plane Coding d) Huffman Coding	**1**	**1**	**3**	**1**	**1.2.5**
	Part – B **(3 x 5 = 15 Marks)** **Instructions: Answer all**					
6	In a criminal investigation, a security camera captured a crucial moment but the image is blurry and lacks clarity. The investigators need to enhance the image to identify the suspects. Describe how you would utilize spatial domain methods to sharpen the image and potentially identify the individuals involved.	**5**	**1**	**2**	**1**	**1.2.4**
7	Radiologists need to identify and isolate tumors in a series of MRI scans. Some tumors have similar intensities to surrounding tissue, making them challenging to distinguish. Detail the approach you would take using image segmentation techniques to accurately detect and isolate tumors in the MRI scans.	**5**	**2**	**3**	**1**	**2.2.3**
8	An organization needs to digitally archive a large number of important documents. They want to ensure that the documents are stored efficiently while preserving all information. How would you apply lossless compression techniques, specifically Run Length Coding, to efficiently store and archive the documents while guaranteeing no loss of information?	**5**	**2**	**3**	**1**	**1.1.4**
	Part – C **(3 x 10 = 30 Marks)** **Instructions: Answer all**					
9	Describe a step-by-step process, along with the rationale behind each step, for how you would use local histogram processing and adaptive filters to enhance the quality of an old photograph that has degraded over time and contains significant historical information?	**10**	**3**	**2**	**1**	**2.3.4**
10	Elucidate the steps necessary to implement local histogram equalization employed to improve contrast and enhance details in an image characterized by varying lighting conditions across different regions.	**10**	**3**	**2**	**1**	**2.1.1**
11	How would you address the challenge of segmenting an image containing multiple objects of interest with varying lighting conditions, using the region-growing method for region-based segmentation?	**10**	**3**	**3**	**1**	**1.2.4**

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy. Course Outcome (CO) and Bloom's level (BL) Coverage in Questions**





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DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

SET - B

Academic Year: 2023-24 (ODD)

Test: CLAT-2 **Date: 09**-10-2023
Course Code & Title: 18AIE332T - Image and Video Processing **Duration:** 2 Hour
Year & Sem: IV Year & VII Semester **Max. Marks:** 50 Marks

Course Articulation Matrix:

Course Learning Outcomes (CO):	*At the end of this course, learners will be able to:*
CO-1	*Apply the fundamental concepts of a digital image processing system*
CO-2	*Compute the techniques for image enhancement and restoration*
CO-3	*Interpret the various image compression and segmentation methods on digital images*
CO-4	*Analyze various motion techniques used in video coding*
CO-5	*Implement the concepts of digital image, video processing and their application*

1	2	3	4	5	6	7	8	9	10	11	12	PSO		
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual &Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
3	2	2	2	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-

Part – A
(5 x 1 = 5 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Spatial filter is used for reducing noise in an image either it might be filters or processing, If it is processing the values will not be cent percent, if not Filters, choose the best Methods in the given below? a) Smoothing Linear Filters b) Sharpening Spatial Filters c) Combined Spatial Enhancement Methods d) Local Histogram Processing	1	2	2	2	2.1.2
2	In the context of the Fourier transform, what does the term "spectrum" refer to? a. A range of frequencies in a signal b. The amplitude of a signal c. The time-domain representation of a signal d. The phase of a signal	1	3	2	2	2.2.3
3	In an image processing task, if you want to separate objects based on their color similarity. Which segmentation technique would be most effective? a) Texture Based Segmentation b) Region Splitting and Merging	1	3	3	3	3.1.4

	c) Region Growing d) Line Detection					
4	Which of the following image compression formats is commonly used for lossy compression of photographic images? a) JPEG b) PNG c) GIF d) TIFF	**1**	**1**	**3**	**3**	**3.1.1**
5	Find the suitable characteristic of lossy compression from the given option in which the images should not be redundant? A) No data loss B) Smaller file sizes C) Suitable for text documents D) Slower compression and decompression	**1**	**2**	**3**	**3**	**3.2.3**
Part – B (3 x 5 = 15 Marks) Instructions: Answer All						
6	You are a photo restoration specialist tasked with reviving an old, faded photograph that holds sentimental value to a client. The image lacks contrast, making details hard to discern. How would you employ spatial domain methods to enhance the contrast and revive the old photograph?	**5**	**5**	**2**	**2**	**2.8.1**
7	In an autonomous vehicle, a camera system is used for lane detection and navigation. However, varying lighting conditions and shadows affect the accuracy of lane detection. Explain how you would utilize image segmentation techniques to ensure accurate and reliable lane detection for the autonomous vehicle.	**5**	**6**	**3**	**4**	**4.5.1**
8	A hospital has a vast database of medical images (X-rays, CT scans, etc.). They want to implement an efficient compression strategy to reduce storage requirements while maintaining diagnostic quality. How would you apply image compression techniques to achieve efficient storage of medical images without compromising diagnostic accuracy?	**5**	**4**	**3**	**4**	**4.6.1**
Part – B (3 x 10 = 30 Marks) Instructions: Answer All						
9	In image compression, what are the key differences between lossless and lossy compression techniques, and under what circumstances would you choose one over the other?	**10**	**5**	**2**	**2**	**2.6.2**
10	Plot the basics of frequency domain methods and discuss how the images will be Smoothen and sharpening can be done in order to reduce the noise.	**10**	**6**	**2**	**2**	**2.8.4**
11	How does the efficiency of Huffman coding change when applied to different types of data, such as text, images, or binary files? Are there specific considerations for adapting Huffman coding to different data types?	**10**	**4**	**3**	**4**	**4.5.1**

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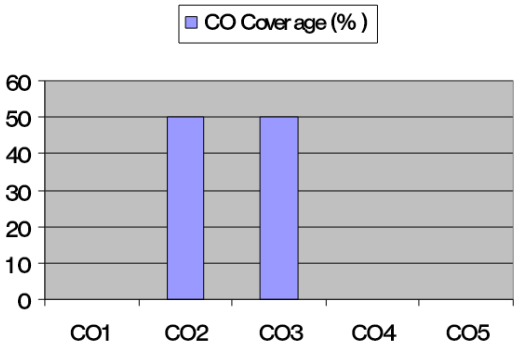

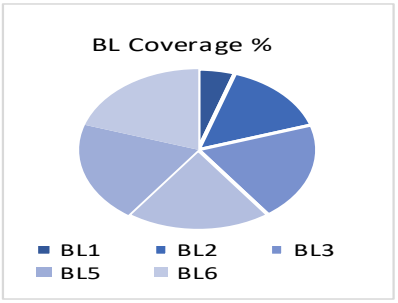

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DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

SET - C

Academic Year: 2023-24 (ODD)

Test: CLAT-2 | **Date:** 09-10-2023
Course Code & Title: 18AIE332T - Image and Video Processing | **Duration:** 1 Hour
Year & Sem: III Year & V Semester | **Max. Marks:** 50 Marks

Course Articulation Matrix:

Course Learning Outcomes (CO):	*At the end of this course, learners will be able to:*
CO-1	*Apply the fundamental concepts of a digital image processing system*
CO-2	*Compute the techniques for image enhancement and restoration*
CO-3	*Interpret the various image compression and segmentation methods on digital images*
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1	2	3	4	5	6	7	8	9	10	11	12	PSO		
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual &Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
3	2	2	2	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
3	2	2	3	-	-	-	-	-	-	-	3	-	-	-

Part – A
(5 x 1 = 5 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Select the technique that utilizes the statistics of an image's histogram to enhance specific regions or features. a) Using histogram statistics for image enhancement b) Smoothing Spatial filters c) Fundamentals of Spatial Filtering d) Order statistics nonlinear filters	1	2	2	2	2.1.2
2	Relate the primary purpose of homomorphic filtering in image processing. a) Image Smoothing b) Image Sharpening c)Enhancement of both high and low frequency components d) Selective Filtering	1	3	2	2	2.2.3
3	In a medical image, you need to identify the edges of tumors for further analysis. Choose the technique which would be most appropriate.	1	3	3	3	3.1.4

	a) Edge Models b) Region Growing c) Line Detection d) Thresholding					
4	Name the term for the unnecessary or redundant information present in an image for compression purposes. a) Coding Redundancy b) Temporal Redundancy c) Irrelevant Information d) Image Noise	**1**	**1**	**3**	**3**	**3.1.1**
5	Name the technique that involves splitting an image into small blocks of pixels a) Transform Coding b) Predictive Coding c) Wavelet Coding d) Huffman Coding	**1**	**2**	**3**	**3**	**3.2.3**
Part – B (3 x 5 = 15 Marks) Instructions: Answer All						
6	Explain how you would use frequency domain methods to selectively reduce the background noise in the audio recording of a studio podcast episode without compromising the clarity of speech.	**5**	**5**	**2**	**2**	**2.8.1**
7	Describe the image compression techniques you would use to balance file size reduction with preserving the visual quality for the web-based gallery that a web developer is creating for a photography website.	**5**	**6**	**3**	**4**	**4.5.1**
8	Demonstrate how image compression techniques, including Transform Coding, would be used to process and compress images before they are stored on the platform for a popular social media platform looking to implement an image compression strategy for user-uploaded photos. Explain how this aligns with the JPEG standard for image compression.	**5**	**4**	**3**	**4**	**4.6.1**
Part – B (3 x 10 = 30 Marks) Instructions: Answer All						
9	Explain how Histogram Equalization and Local Histogram Processing can be applied to adjust the contrast and brightness levels of drone-captured images for more accurate weed detection in the precision farming.	**10**	**5**	**2**	**2**	**2.6.2**
10	Describe the application of Image Sharpening and Inverse Filtering (Wiener) in improving in-cabin camera images to make facial features more distinct for reliable drowsiness detection.	**10**	**6**	**2**	**2**	**2.8.4**
11	Illustrate how Region Splitting and Merging can be utilized to segment tumor regions in CT scans, enabling a detailed analysis of tumor characteristics. Outline the advantages and potential factors to consider regarding the segmentation technique.	**10**	**4**	**3**	**4**	**4.5.1**

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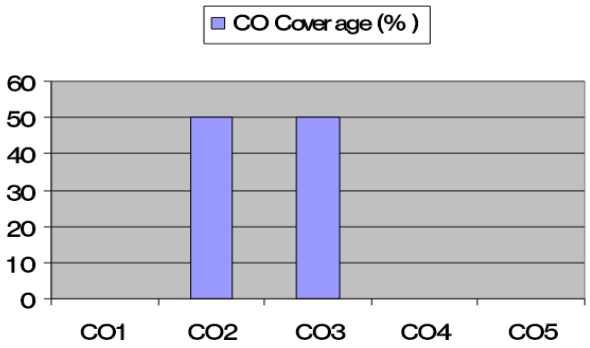

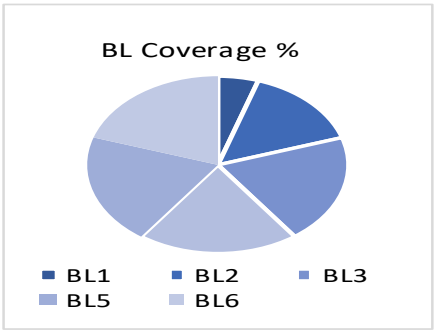

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DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

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SET - D

Academic Year: 2023-24 (ODD)

Test: CLAT-2 **Date:** 09-10-2023
Course Code & Title: 18AIE332T – Image and Video Processing **Duration:** 1 Hour
Year & Sem: III Year & V Semester **Max. Marks:** 50 Marks

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CO-6	*Ability to understand the needs and familiarize the DNA Computing*

1	2	3	4	5	6	7	8	9	10	11	12	PSO		
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual &Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
2	*3*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	*1*
3	*3*	*1*	*2*	*2*	-	-	-	-	-	-	-	-	-	*2*
3	*3*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	*2*
3	*3*	*2*	*2*	*1*	-	-	-	-	-	-	-	-	-	*2*
3	*3*	*2*	*2*	*2*	-	-	-	-	-	-	-	-	-	*3*
2	*3*	*2*	*2*	*2*	-	-	-	-	-	-	-	-	-	*3*

Part – A
(5 x 1 = 5 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Which spatial domain technique would you use to improve the contrast of a grayscale handwritten digit image for optical character recognition (OCR) by redistributing the intensity values across the entire range? a) Histogram Processing b) Histogram Equalization c) Histogram Matching d) Local Histogram Processing	**1**	**2**	**2**	**2**	**2.1.2**
2	Spatial filter is used for reducing noise in an image either it might be filters or processing, If it is processing the values will not be cent percent, if not Filters, choose the best Methods in the given below? a) Smoothing Linear Filters b) Sharpening Spatial Filters c) Combined Spatial Enhancement Methods d) Local Histogram Processing	**1**	**3**	**2**	**2**	**2.2.3**
3	Select the technique that utilizes the statistics of an image's histogram to enhance specific regions or features. a) Using histogram statistics for image enhancement b) Smoothing Spatial filters c) Fundamentals of Spatial Filtering d) Order statistics nonlinear filters	**1**	**3**	**3**	**3**	**3.1.4**
4	Which compression technique would be most suitable for efficiently representing these consecutive occurrences of the same value with a code indicating the value and its count? a) Run Length Coding	**1**	**1**	**3**	**3**	**3.1.1**

	b) Bit Plane Coding c) LZW Coding d) Arithmetic Coding					
5	Identify the suitable technique in image compression based on dividing the image into blocks of pixels and applying a mathematical transform. a) Transform Coding b) Predictive Coding c) Wavelet Coding d) Huffman Coding	**1**	**2**	**3**	**3**	**3.2.3**
	Part – B **(3 x 5 = 15 Marks)** **Instructions: Answer all**					
6	An organization needs to digitally archive a large number of important documents. They want to ensure that the documents are stored efficiently while preserving all information. How would you apply lossless compression techniques, specifically Run Length Coding, to efficiently store and archive the documents while guaranteeing no loss of information?	**5**	**5**	**2**	**2**	**2.8.1**
7	You are a photo restoration specialist tasked with reviving an old, faded photograph that holds sentimental value to a client. The image lacks contrast, making details hard to discern. How would you employ spatial domain methods to enhance the contrast and revive the old photograph?	**5**	**6**	**3**	**4**	**4.5.1**
8	Describe the image compression techniques you would use to balance file size reduction with preserving the visual quality for the web-based gallery that a web developer is creating for a photography website.	**5**	**4**	**3**	**4**	**4.6.1**
	Part – C **(3 x 10 = 30 Marks)** **Instructions: Answer all**					
9	You have an image with varying lighting conditions across different regions. Explain how local histogram processing can be used to enhance the contrast and details in this image. Describe the steps involved in implementing local histogram equalization. Provide an example illustrating its effectiveness and potential challenges.	**10**	**5**	**2**	**2**	**2.6.2**
10	How does the efficiency of Huffman coding change when applied to different types of data, such as text, images, or binary files? Are there specific considerations for adapting Huffman coding to different data types?	**10**	**6**	**2**	**2**	**2.8.4**
11	Describe the application of Image Sharpening and Inverse Filtering (Wiener) in improving in-cabin camera images to make facial features more distinct for reliable drowsiness detection.	**10**	**4**	**3**	**4**	**4.5.1**

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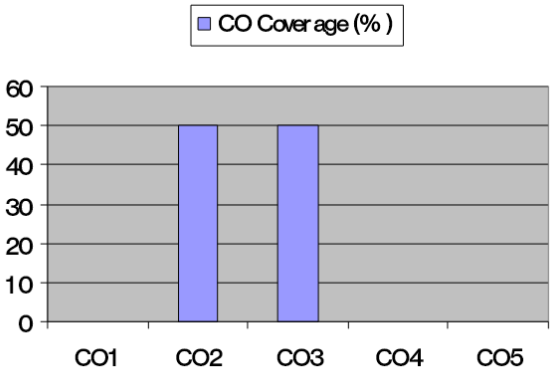

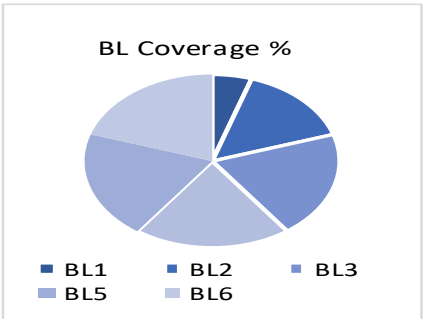

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