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-3 | **Date: 01**-11-2023
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 Immune 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*

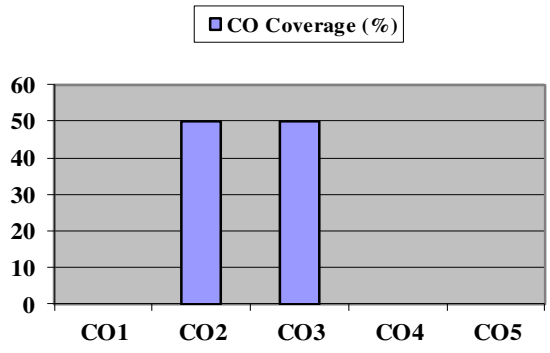
Part – A
(5 x 1 = 5 Marks)

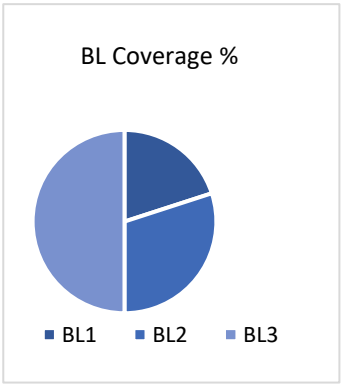
Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	In a video editing software, what is the typical first step in video processing for creating a movie? A. Applying color correction to the entire video B. Adding special effects and transitions C. Importing raw video footage D. Exporting the final movie	**1**	**2**	**1**	**1**	**1.2.1**
2	What is the significance of applying rigid motion in Cartesian for character animation? A. It adds dynamic lighting effects to the character. B. It deforms the character during movement for realism. C. It maintains the character's shape and size during translation and rotation. D. It changes the character's appearance as it moves.	**1**	**1**	**1**	**1**	**1.2.1**
3	What is the primary focus of 2D motion estimation in image processing? A. Estimating the depth of objects in a scene. B. Determining the motion of objects in a single plane.	**1**	**1**	**1**	**1**	**1.2.1**

	C. Extracting the color information from an image. D. Analyzing the texture of an image.					
4	In the context of video processing, what does the "occlusion problem" refer to? A. The issue of high-resolution video encoding. B. The challenge of detecting moving objects. C. The difficulty of estimating motion when objects partially or completely hide each other. D. The problem of color correction in video frames.	**1**	**2**	**1**	**1**	**1.2.1**
5	Which numerical optimization method is commonly used in 2D and 3D motion estimation problems to refine motion parameters? A. Gradient Descent B. Particle Swarm Optimization C. Newton-Raphson Method D. Principal Component Analysis	**1**	**1**	**1**	**1**	**1.2.1**
Part – B (3 x 5 = 15 Marks) Instructions: Answer all						
6	Describe the 3D motion models to improve the drones' navigation and decision-making in complex 3D environments.	**5**	**1**	**1**	**1**	**1.2.1**
7	Explain how you would apply LMMSE filtering to improve the audio quality of the live audio stream for the virtual music concert. Provide a step-by-step plan for implementing LMMSE filtering, and describe the key principles and benefits of using this filtering technique in the context of the concert.	**5**	**2**	**1**	**1**	**1.2.1**
8	Discuss mesh-based motion estimation to enhance the AUV's navigation and data collection for underwater environment.	**5**	**2**	**1**	**1**	**1.2.1**
Part – C (3 x 10 = 30 Marks) Instructions: Answer all						
9	Describe in detail how you would utilize geometric image formation principles to create precise 3D reconstructions of ancient artifacts and archaeological sites.	**10**	**3**	**1**	**1**	**1.2.1**
10	Using Newton-Raphson method, find the roots of complex equations for image analysis.	**10**	**3**	**1**	**1**	**1.2.1**
11	Illustrate how you would utilize waveform-based coding to achieve higher compression rates while maintaining video quality.	**10**	**3**	**1**	**1**	**1.2.1**

***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-3 **Date: 0**1-11-2023
Course Code & Title: 18AIE332T - Image and Video Processing **Duration:** 2 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*
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	Which of the two filtering techniques, motion-weighted median filtering or motion-based detection filtering, is more suitable for detecting and tracking moving objects in video sequences? A) Motion-weighted median filtering B) Motion-based detection filtering C) Both techniques are equally suitable D) Neither technique is suitable for this purpose	1	2	4	2	2.1.2
2	What is the standard frame rate for analog NTSC video signals commonly used in North America and Japan? A) 24 frames per second B) 30 frames per second C) 25 frames per second D) 60 frames per second	1	1	4	2	3.1.1
3	Find the waveform-based audio coding method is known for its lossless compression, preserving audio quality perfectly?	1	2	4	2	2.1.2

	A) MP3 B) FLAC C) AAC D) WMA					
4	Industries mentioned below commonly uses video processing for special effects in movies? A) Agriculture B) Healthcare C) Entertainment D) Transportation	**1**	**1**	**5**	**3**	**3.1.1**
5	Which technique is commonly used for motion estimation in video processing? A) Block matching B) Spectral analysis C) Facial recognition D) Text-to-speech conversion	**1**	**2**	**5**	**3**	**3.2.3**
Part – B (3 x 5 = 15 Marks) Instructions: Answer All						
6	Explain the concept of photometric image formation in video processing. Discuss the key factors that influence the photometric properties of an image in the context of the imaging process. Provide examples to illustrate how changes in lighting conditions, reflectance, and camera settings can impact the photometric characteristics of an image.	**5**	**3**	**4**	**2**	**2.8.1**
7	Compare and contrast Photometric effects on 3D motion Provide specific examples to illustrate the its effects and discuss their significance in computer vision.	**5**	**3**	**5**	**4**	**4.5.1**
8	Enumerate the Steepest Descent method in the context of video processing. Discuss the fundamental principles and its role in optimizing various video processing tasks. Provide examples of how the Steepest Descent method can be applied to improve video quality, reduce artifacts, or enhance specific features.	**5**	**3**	**5**	**4**	**4.6.1**
Part – B (3 x 10 = 30 Marks) Instructions: Answer All						
9	Explain the concept of time-varying image formation models and 3D motion models in the context of video processing. Discuss how these models are utilized to represent and analyze motion in video sequences. Provide examples of real-world applications where time-varying models and 3D motion models play a crucial role in video processing.	**10**	**3**	**4**	**2**	**2.6.2**
10	Elucidate the concept of motion estimation in video processing. Discuss the significance of motion estimation in various video processing applications. Describe common techniques and algorithms used for motion estimation, including block matching and optical flow methods.	**10**	**3**	**4**	**2**	**2.8.4**
11	Explain the concept of geometric image formation in video processing. Discuss the fundamental principles underlying geometric image formation and the role it plays in understanding the geometry and perspective of objects in video sequences. Describe common	**10**	**3**	**5**	**4**	**4.5.1**

	techniques and algorithms used in model geometric transformations.					

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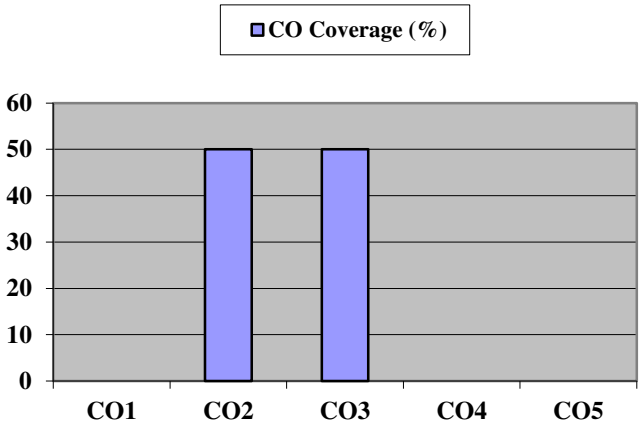

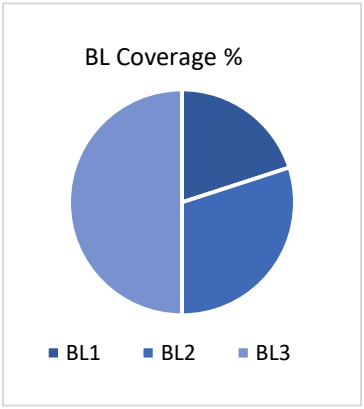

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SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

SET - C

Academic Year: 2023-24 (ODD)

Test: CLAT-3 **Date: 0**1-11-2023
Course Code & Title: 18AIE332T - Image and Video Processing **Duration:** 2 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*
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	How does the sampling structure differ between analog and digital video? A) Analog video uses continuous sampling while digital video uses discrete sampling. B) Digital video has a higher sampling rate compared to analog video. C) Both analog and digital video use the same sampling structure. D) Analog video uses a lower resolution for sampling compared to digital video.	1	2	4	2	2.1.2
2	In computer vision, what kind of motion involves objects or scenes undergoing transformations that can be described using translation and rotation? A) Rigid motion in Cartesian B) Homogeneous coordinates C) Deformable motion D) Digital video processing	1	1	4	2	3.1.1
3	Select the type of filtering that employed to diminish noise in video frames by taking into account the correlation between neighboring pixels. A) Median filtering B) Intra frame filtering C) Motion detection filtering D) Photometric filtering	1	2	4	2	2.1.2

4	In video coding, which method involves representing images as a set of waveforms? A) Waveform based coding B) Block based transform coding C) Predictive coding D) Gradient based optimization	**1**	**1**	**5**	**3**	**3.1.1**
5	Which motion estimation method involves dividing the video frame into blocks and finding the best match between corresponding blocks in consecutive frames? A) Generalized block motion B) Deformable block motion C) Translational block motion D) Mesh based Motion Estimation	**1**	**2**	**5**	**3**	**3.2.3**
Part – B (3 x 5 = 15 Marks) Instructions: Answer All						
6	Describe comprehensively how noise and imperfection can be eliminated from an artwork without affecting the original details by using median and weighted median filtering.	**5**	**3**	**4**	**2**	**2.8.1**
7	Compare and contrast 2D motion with apparent motion. Provide specific examples to illustrate the difference between these two types of motions and discuss their significance in computer vision.	**5**	**3**	**5**	**4**	**4.5.1**
8	Discuss the applications and advantages of hierarchical motion estimation, mesh-based motion estimation, region-based motion estimation, and multi-resolution motion estimation in computer vision.	**5**	**3**	**5**	**4**	**4.6.1**
Part – B (3 x 10 = 30 Marks) Instructions: Answer All						
9	Explain the significance of using digital video processing techniques in video surveillance security system. Provide specific examples of how techniques like motion detection-based filtering and intra-frame filtering (LMMSE) can enhance the effectiveness of the surveillance system.	**10**	**3**	**4**	**2**	**2.6.2**
10	Illustrate the importance of transform coding in video compression. Provide specific examples of how block-based transform coding contributes to efficient data transmission.	**10**	**3**	**4**	**2**	**2.8.4**
11	Explain the occlusion problem and the aperture problem in motion estimation. Provide specific examples of situations where each of these problems can occur, and discuss potential solutions to mitigate their effects.	**10**	**3**	**5**	**4**	**4.5.1**

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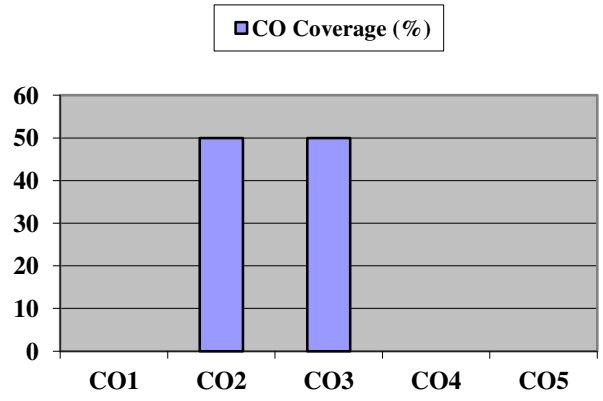

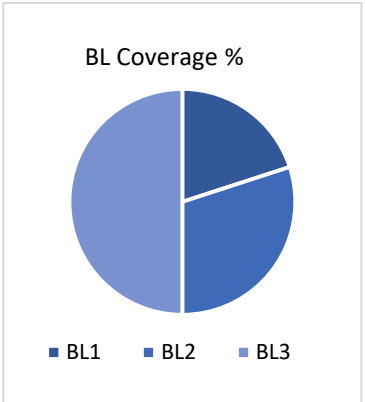

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SET - D

Academic Year: 2023-24 (ODD)

Test: CLAT-3 | **Date: 0**1-11-2023
Course Code & Title: 18AIE332T - Image and Video Processing | **Duration:** 2 Hour
Year & Sem: III Year & V Semester | **Max. Marks:** 50 Marks

Course Articulation Matrix:

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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	In computer vision, what kind of motion involves objects or scenes undergoing transformations that can be described using translation and rotation? A) Rigid motion in Cartesian B) Homogeneous coordinates C) Deformable motion D) Digital video processing	1	2	4	2	2.1.2
2	In a video editing software, what is the typical first step in video processing for creating a movie? A. Applying color correction to the entire video B. Adding special effects and transitions C. Importing raw video footage D. Exporting the final movie	1	1	4	2	3.1.1
3	Select the type of filtering that employed to diminish noise in video frames by taking into account the correlation between neighboring pixels. A) Median filtering B) Intra frame filtering C) Motion detection filtering D) Photometric filtering	1	2	4	2	2.1.2

4	Which of the two filtering techniques, motion-weighted median filtering or motion-based detection filtering, is more suitable for detecting and tracking moving objects in video sequences? A) Motion-weighted median filtering B) Motion-based detection filtering C) Both techniques are equally suitable D) Neither technique is suitable for this purpose	**1**	**1**	**5**	**3**	**3.1.1**
5	Which numerical optimization method is commonly used in 2D and 3D motion estimation problems to refine motion parameters? A. Gradient Descent B. Particle Swarm Optimization C. Newton-Raphson Method D. Principal Component Analysis	**1**	**2**	**5**	**3**	**3.2.3**
Part – B (3 x 5 = 15 Marks) Instructions: Answer All						
6	Discuss mesh-based motion estimation to enhance the AUV's navigation and data collection for underwater environment.	**5**	**3**	**4**	**2**	**2.8.1**
7	Discuss the applications and advantages of hierarchical motion estimation, mesh-based motion estimation, region-based motion estimation, and multi-resolution motion estimation in computer vision.	**5**	**3**	**5**	**4**	**4.5.1**
8	Compare and contrast Photometric effects on 3D motion Provide specific examples to illustrate the its effects and discuss their significance in computer vision.	**5**	**3**	**5**	**4**	**4.6.1**
Part – B (3 x 10 = 30 Marks) Instructions: Answer All						
9	Explain the concept of geometric image formation in video processing. Discuss the fundamental principles underlying geometric image formation and the role it plays in understanding the geometry and perspective of objects in video sequences. Describe common techniques and algorithms used in model geometric transformations.	**10**	**3**	**4**	**2**	**2.6.2**
10	Explain the occlusion problem and the aperture problem in motion estimation. Provide specific examples of situations where each of these problems can occur, and discuss potential solutions to mitigate their effects.	**10**	**3**	**4**	**2**	**2.8.4**
11	Using Newton-Raphson method, find the roots of complex equations for image analysis.	**10**	**3**	**5**	**4**	**4.5.1**

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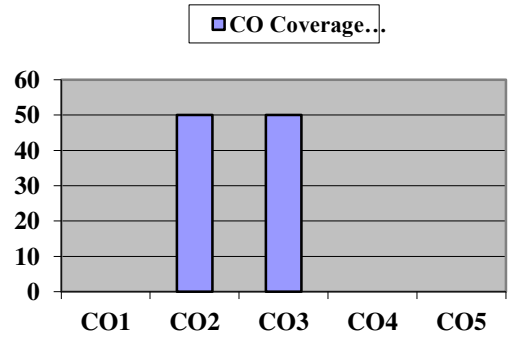

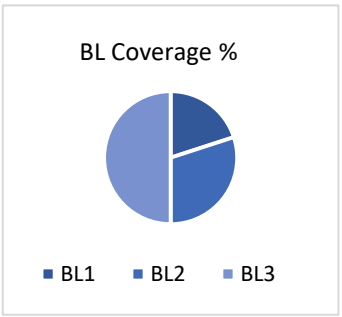

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