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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**

Course Code: 24AM6PEVCV **Max Marks: 100**

Course: Video Analytics Using OpenCV

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Define callback functions and explain its significance in handling user events in OpenCV.	*CO1*	*PO1*	**03**
	b)		Design an user interface in OpenCV that incorporates trackbars to enable interactive parameter adjustment for image processing operations.	*CO1*	*PO3*	**07**
	c)		i. Implement an automated sunglass filter using OpenCV to dynamically detect and overlay sunglasses onto faces in a live video feed. ii. Provide the algorithmic steps involved for the given scenario.	*CO1*	*PO3*	**10**
			OR			
2	a)		Differentiate traditional image processing from computer vision.	*CO2*	*PO2*	**06**
	b)		Explain the basic mathematical operations on images using OpenCV.	*CO1*	*PO1*	**06**
	c)		Create a Python program that blends two images dynamically, where the blending factor is controlled by the position of a slider.	*CO3*	*PO5*	**08**
			UNIT - II			
3	a)		Write a program using OpenCV to compute: i) Display the gradient magnitude ii) Directions of an image using Sobel operators.	*CO3*	*PO2*	**10**
	b)		Explain the Simple Blob Detector parameters in OpenCV.	*CO1*	*PO1*	**05**
	c)		Define thresholding. Elucidate the different types of thresholding techniques in OpenCV.	*CO2*	*PO1*	**05**
			OR			
4	a)		Create an OpenCV-based interactive application where users can adjust the kernel size and observe the real-time smoothing effect on an image.	*CO3*	*PO5*	**06**
	b)		Analyze the impact of kernel size and shape on morphological operations like erosion and dilation for noise removal.	*CO2*	*PO2*	**06**

		c)	Evaluate the performance of bilateral filtering in preserving edges while smoothing images.	*CO2*	*PO3*	**08**
			UNIT - III			
	5	a)	i. Illustrate how Hough Circle Transforms can be utilized for automatic cell detection and measurement in medical imaging. ii. Identify the challenges and optimizations required for accurate results.	*CO3*	*PO3*	**10**
		b)	i. Implement an image stitching application using Oriented FAST and Rotated BRIEF (ORB) features to create panoramic images from a series of overlapping photographs. ii. Comprehend the key steps involved in seamless panorama generation.	*CO3*	*PO3*	**10**
			OR			
	6	a)	Implement a program in OpenCV to align image-based documents for uniform presentation of documents.	*CO3*	*PO3*	**10**
		b)	Illustrate the significance of homography to merge the camera feeds into a single panoramic view for comprehensive monitoring.	*CO3*	*PO3*	**10**
			UNIT - IV			
	7	a)	Design an image classification pipeline for a medical diagnosis application, highlight the steps involved from data collection to model deployment.	*CO3*	*PO3*	**10**
		b)	i. Outline the key steps involved in integrating the GrabCut algorithm into a digital pathology workflow. ii. Describe the long-term implications and benefits of incorporating GrabCut and similar algorithms into digital pathology practices.	*CO1*	*PO1*	**10**
			OR			
	8	a)	Build a pipeline using optical flow to enhance video compression. Elucidate how motion vectors can be used to reduce redundancy and improve compression efficiency.	*CO3*	*PO3*	**10**
		b)	Describe video stabilization system to handle complex camera motions, such as rotations and zooms using OpenCV.	*CO3*	*PO3*	**10**
			UNIT - V			
	9	a)	Outline the various challenges of class imbalance.	*CO1*	*PO1*	**05**
		b)	Discuss the steps in image classification system using caffe.	*CO1*	*PO1*	**05**
		c)	Design a Single Short Multibox Detector (SSD) based face detection system for a video conferencing application.	*CO3*	*PO3*	**10**
			OR			
		a)	Compare and contrast the performance of pre-trained models in Caffe and TensorFlow for classifying natural images.	*CO2*	*PO1*	**06**

	10	b)	Analyze the limitations of SSD-based face detection when applied to images with varying lighting conditions and occlusions.	*CO2*	*PO1*	**06**
		c)	Create an OpenCV-based application that uses YOLO to detect and count specific objects (e.g., vehicles or people) in a given video feed.	*CO3*	*PO5*	**08**

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