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

Autonomous Institute Affiliated to VTU

January / February 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)		Explain the image transformations in OpenCV.	CO1	PO1	**06**
	b)		Deduce the steps in creating a simple sunglass filter. Outline the various challenges and solutions involved in the given scenario.	CO1	PO1	**08**
	c)		Apply callback functions in OpenCV to handle mouse events.	CO2	PO3	**06**
			OR			
2	a)		Write a program to use a bitwise AND operation to extract a region of interest (ROI) from an image.	CO2	PO2	**06**
	b)		If you were to rotate an image by 45 degrees, how would you handle the pixels that fall outside the image boundary?	CO2	PO1	**06**
	c)		Create a Python program to annotate an image with labels and bounding boxes dynamically based on user input via mouse clicks.	CO3	PO5	**08**
			UNIT - II			
3	a)		Differentiate opening and closing morphological operations.	CO1	PO2	**04**
	b)		Apply suitable image gradients for detecting the edges of objects on a factory conveyor belt.	CO3	PO2	**08**
	c)		Infer the principles of blob detection in binary images with key parameters involved and their influence detection process using OpenCV.	CO2	PO1	**08**
			OR			
4	a)		Compare and contrast adaptive thresholding with global thresholding for images with uneven lighting conditions.	CO2	PO2	**06**
	b)		Evaluate the performance of bilateral filtering in preserving edges while smoothing images.	CO2	PO3	**06**
	c)		Design a program to apply and visualize the effects of different filters (e.g., Gaussian, median, and bilateral) on a noisy image.	CO3	PO5	**08**
			UNIT - III			
5	a)		Apply Hough Transform in a lane marking detection system.	CO3	PO3	**10**

		b)	i. Summarize the challenges of capturing images with high dynamic range using standard cameras. ii. How does High Dynamic Range Imaging (HDR) imaging address these challenges?	*CO2*	*PO3*	**10**
			OR			
	6	a)	Illustrate the importance of homography to merge the camera feeds into a single panoramic view for comprehensive monitoring.	*CO3*	*PO2*	**10**
		b)	Explain the concept of image inpainting and its significance.	*CO1*	*PO1*	**05**
		c)	Describe the different Geometric Transformation models available in OpenCV.	*CO2*	*PO1*	**05**
			UNIT – IV			
	7	a)	Apply GrabCut algorithm for a photo editing application that allows users to extract objects from images.	*CO3*	*PO1*	**08**
		b)	Explain the MeanShift and CamShift algorithms for object tracking. Compare their effectiveness and provide a scenario where each would be particularly useful.	*CO2*	*PO3*	**06**
		c)	Elucidate multiple object tracking in a crowded scene using OpenCV.	*CO3*	*PO2*	**06**
			OR			
	8	a)	Exemplify the techniques and algorithms that can be used in a security system which detects and identifies objects in real-time video feeds, Implement using OpenCV and a pre-trained deep learning model.	*CO3*	*PO3*	**08**
		b)	Explain the concept of motion estimation using optical flow.	*CO1*	*PO2*	**04**
		c)	Implement Kalman Filter to predict the future state of an object, and update it with new measurements.	*CO2*	*PO3*	**08**
			UNIT - V			
	9	a)	Illustrate image classification for different animals using the Caffe deep learning framework.	*CO3*	*PO3*	**08**
		b)	Elaborate on the architecture and working of the OpenPose model in multi-person pose estimation.	*CO2*	*PO2*	**04**
		c)	i. Examine the principles of Single Short Multibox Detector (SSD) based face detection. ii. Distinguish between Single Short Multibox Detector (SSD) based face detection with traditional face detection techniques.	*CO1*	*PO2*	**08**
			OR			
	10	a)	Evaluate the suitability of SSD versus YOLO for detecting small objects in drone-captured imagery.	*CO2*	*PO3*	**06**
		b)	Compare and contrast the performance of pre-trained models in Caffe and TensorFlow for classifying natural images.	*CO3*	*PO1*	**06**
		c)	Design an OpenCV-based system that uses a TensorFlow pre-trained model to classify images in real time and display the results with confidence scores.	*CO3*	*PO5*	**08**

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