Lesson 4: Edge Detection and Feature Extraction

Description:

This lesson focuses on detecting object boundaries and extracting essential features from images using various edge detection algorithms.

Content:

1. What is Edge Detection?

Edge detection identifies points in an image where brightness changes sharply, revealing boundaries of objects.

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2. Common Edge Detection Methods

- Sobel Operator: Detects vertical and horizontal edges using gradient approximation.
- Prewitt Operator: Similar to Sobel but slightly simpler in computation.
- Laplacian of Gaussian (LoG): Combines smoothing with edge detection.
- Canny Edge Detector: A multi-stage algorithm that provides precise and clean edge maps.

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3. Thresholding in Edge Detection

Learn how setting proper thresholds can control which edges are detected and which are ignored.

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4. Feature Extraction Basics

After edge detection, features like corners, shapes, and contours can be extracted for higher-level tasks such as classification or tracking.

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5. Applications

- Detecting lane lines in self-driving cars
- Identifying tumors in medical images
- Object detection and tracking in video analysis

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6. Outro

A recap of edge detection methods and their importance in building advanced computer vision models.