VEHICLE DETECTION AND COUNTING USING OPENCV

A Computer Vision-Based Traffic Monitoring System

Introduction

- A real-time vehicle detection and counting system using OpenCV.
- Useful for traffic monitoring and data analysis.

Key Technologies

Python, OpenCV, Computer Vision, Background Subtraction.

Problem Statement

- Traffic congestion is a major issue in urban areas.
- Manual vehicle counting is inefficient and error-prone.

Objectives

- Develop an automated system to detect and count vehicles.
- Improve accuracy and efficiency using image processing techniques.

Programming Language : Python
Libraries Used: OpenCV, NumPy
Tools: Jupyter Notebook / PyCharm / VS Code
Hardware Requirements:

- Minimum 4GB RAM
- Webcam or pre-recorded video footage

Methodology

- **Video Input:** Load a traffic video for processing.
- **Preprocessing:** Convert frames to grayscale and apply Gaussian Blur.
- **Motion Detection:** Use Background Subtraction (MOG2) for detecting moving objects.
- **Contour Detection:** Identify and filter vehicle contours.
- **Counting Mechanism:** Track vehicles crossing a predefined line.
- **Result Output:** Display real-time vehicle count and save the output video.

Results

- **Vehicle Count:** Displayed in real-time on video frames.
- **Processed Video:** Generated output with bounding boxes and count.
- **Performance:** Achieved high accuracy with well-lit traffic videos.
- **Example Screenshot:** (Insert image from output video)

Conclusion & Future Scope

Conclusion:

- The system successfully detects and counts vehicles.
- Provides a cost-effective solution for traffic monitoring.

Future Enhancements:

- Integrate Deep Learning (YOLO) for improved accuracy.
- Extend to multi-lane and real-time traffic surveillance.