AI-Based Object Detection with Conditional Location Logging

1. Introduction

This project implements an AI-based road monitoring system that detects objects such as vehicles, pedestrians, animals, and obstacles using a pre-trained deep learning model. The system operates in real time on live camera feeds or recorded road videos

2. Objective

Develop an AI-based system that detects any object on the road (vehicles, animals, pedestrians, obstacles) and stores the detection data along with latitude and longitude in the database only when an object is detected.

3. Model Selection & Setup

The project uses YOLOv8 (You Only Look Once – Version 8) for object detection. YOLOv8 was selected due to its real-time inference capability, high accuracy, and lightweight architecture suitable for road monitoring applications.

4. System Architecture

The system follows the pipeline:

i. Capture frames from camera/video
ii. Perform object detection
iii. Filter detections by confidence
iv. Fetch GPS coordinates conditionally
v. Store detection data in database
vi. Display bounding boxes for validation

5. Detection Pipeline

Frames are captured using OpenCV and passed to the YOLOv8 model. Detected objects are classified and displayed with bounding boxes and labels for debugging and validation.

6. Conditional Location Logging

Location data is logged only if an object is detected with confidence greater than 0.5.

This ensures:

- Only meaningful detections are stored
- Database remains clean and relevant

7. Database Integration

SQLite is used to store detection data. The database schema includes:

- object_id

- object_type

- confidence_score

- timestamp

- latitude

- longitude

Data is inserted into the database only when detection occurs.

8. Output & Validation

The system was tested on live webcam feeds and road videos. Database records were verified using DB Browser for SQLite. Screenshots of detections and database entries were captured.

9. Results

The system accurately detects objects in real time and logs correct GPS coordinates conditionally.

10. Conclusion

This project successfully demonstrates an AI-based road object detection system integrated with conditional location logging.