

Real-Time Illegal Parking Detection System Using YOLOv8 And OCR

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Abstract- Illegal parking is a major problem in urban environments, causing traffic congestion, road blockages, and safety issues. Traditional monitoring methods rely heavily on manual inspection, which is inefficient and time-consuming. This paper presents a real-time illegal parking detection system using computer vision and deep learning techniques. The proposed system uses the YOLOv8 object detection model to identify vehicles from live CCTV feeds and determine whether they are parked in restricted zones. A time-based validation mechanism ensures accurate detection of violations. Additionally, an Optical Character Recognition (OCR) module extracts vehicle license plate numbers for identification. All violations are logged with timestamped images and location details. Experimental results show high accuracy of 96.5% and real-time performance at 28 FPS. The system is scalable, cost-effective, and suitable for smart city applications.

Index Terms- Illegal Parking Detection, YOLOv8, Computer Vision, OCR, Smart City, Deep Learning

I. INTRODUCTION

Illegal parking is a common issue in growing cities, leading to traffic congestion, accidents, and inefficient road usage. Vehicles parked in unauthorized areas block traffic flow and create safety hazards. Current enforcement methods rely on traffic officers, which limits coverage and consistency.

With advancements in artificial intelligence and computer vision, it is possible to automate the detection of such violations. This paper proposes a real-time system that uses CCTV footage and deep learning algorithms to identify illegally parked vehicles. The system reduces manual effort and improves accuracy and efficiency in traffic monitoring.

II. LITERATURE REVIEW

Earlier parking management systems used IoT sensors to detect vehicle presence. While effective in controlled environments, these systems are expensive and not suitable for open roads. Traditional image processing methods, such as background subtraction, were sensitive to lighting conditions and environmental changes.

Recent approaches use deep learning models like YOLO for object detection. These models provide high accuracy and speed, making them suitable for real-time applications. However, many existing systems focus only on vehicle detection and do not include complete violation detection and logging mechanisms. This paper addresses these limitations by integrating detection, time-based validation, and OCR.

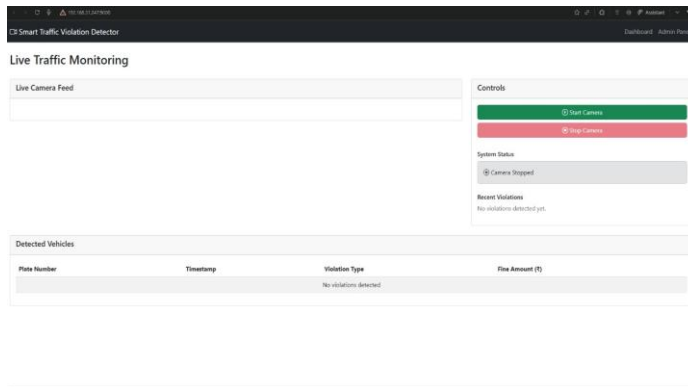
III. SYSTEM ARCHITECTURE

The proposed system is divided into three main components:

1. Input Layer: CCTV or IP cameras capture live video streams
2. Processing Layer: YOLOv8 model detects vehicles and identifies violations
3. Application Layer: Backend server stores data and dashboard displays results

This modular design ensures scalability and easy integration with existing infrastructure.

DASHBOARD SCREENSHOT



Detection with Bounding Boxes



IV. METHODOLOGY

A. Vehicle Detection

The YOLOv8 model is used to detect vehicles such as cars, bikes, trucks, and buses from video frames.

B. Zone Mapping

No-parking areas are defined using polygon coordinates. The system checks whether detected vehicles fall within these zones.

C. Violation Detection

If a vehicle remains stationary within a restricted zone for a predefined time (e.g., 60 seconds), it is marked as a violation.

D. OCR Processing

The system extracts the license plate region and uses OCR to recognize the vehicle number.

E. Data Logging

Violation data, including timestamp, location, and image, is stored in a database for further analysis.

V. SYSTEM FLOW

1. Capture live video from CCTV
2. Detect vehicles using YOLOv8
3. Check if vehicle is inside restricted zone
4. Apply time threshold
5. Extract license plate using OCR
6. Store violation details
7. Display alerts on dashboard

VI. RESULTS AND DISCUSSION

Parameter	Value
Detection Accuracy	96.5%
OCR Accuracy	89.2%
Processing Speed	28 FPS
False Positive Rate	< 2%

The system performs efficiently under various conditions such as daylight, night, and moderate weather. OCR accuracy slightly decreases in low-light conditions, which can be improved with better preprocessing techniques.

VII. CONCLUSION

The proposed system successfully automates illegal parking detection using artificial intelligence and computer vision. It reduces manual effort, improves detection accuracy, and provides real-time monitoring. The system is scalable and can be integrated into smart city infrastructure for better traffic management.

VIII. FUTURE WORK

Future improvements include:

- Integration with Automatic Number Plate Recognition (ANPR) systems
- Cloud-based deployment for scalability
- Mobile application for traffic officers
- Edge computing for faster processing

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