

Vehicle Movement Analysis

using Edge AI

Presented by RAHINI.S

Problem Statement

Managing parking and ensuring campus security pose significant challenges. There is a critical need for a system capable of efficiently detecting authorized and unauthorized vehicles to improve campus safety and operational effectiveness.



Objectives

License Plate Detection:

Implement a system to detect and differentiate between authorized and unauthorized vehicles using license plate information.

Monitor Parking Occupancy:

Provide real-time updates on parking lot usage, indicating frequently occupied areas and peak occupancy times.

Unique Idea



This project combines real-time license plate detection with parking occupancy monitoring using computer vision. It improves campus security by tracking vehicles and enhances parking management. The system provides easy-to-understand insights through a simple interface and can be expanded in the future to include advanced features like vehicle authorization.

Key Features

01

Real-Time License Plate
Detection:

02

Parking Occupancy
Monitoring

03

Integration of Computer
Vision

04

User-Friendly
Dashboard

05

Enhanced Campus
Security

06

Scalability

Process Workflow

Data Collection and Preprocessing:

- Gather vehicle images and license plate datasets
- Preprocess the dataset to prepare for training and testing.

License Plate Detection using YOLO Model:

- Implement YOLO (You Only Look Once) model for real-time license plate detection.
- Train the YOLO model on the dataset to recognize license plates in vehicle images.

Process Workflow

Text Extraction using EasyOCR:

- Integrate EasyOCR for extracting text from detected license plates.
- .Process the extracted text to identify and categorize vehicle information

Parking Occupancy Monitoring using CNN Model:

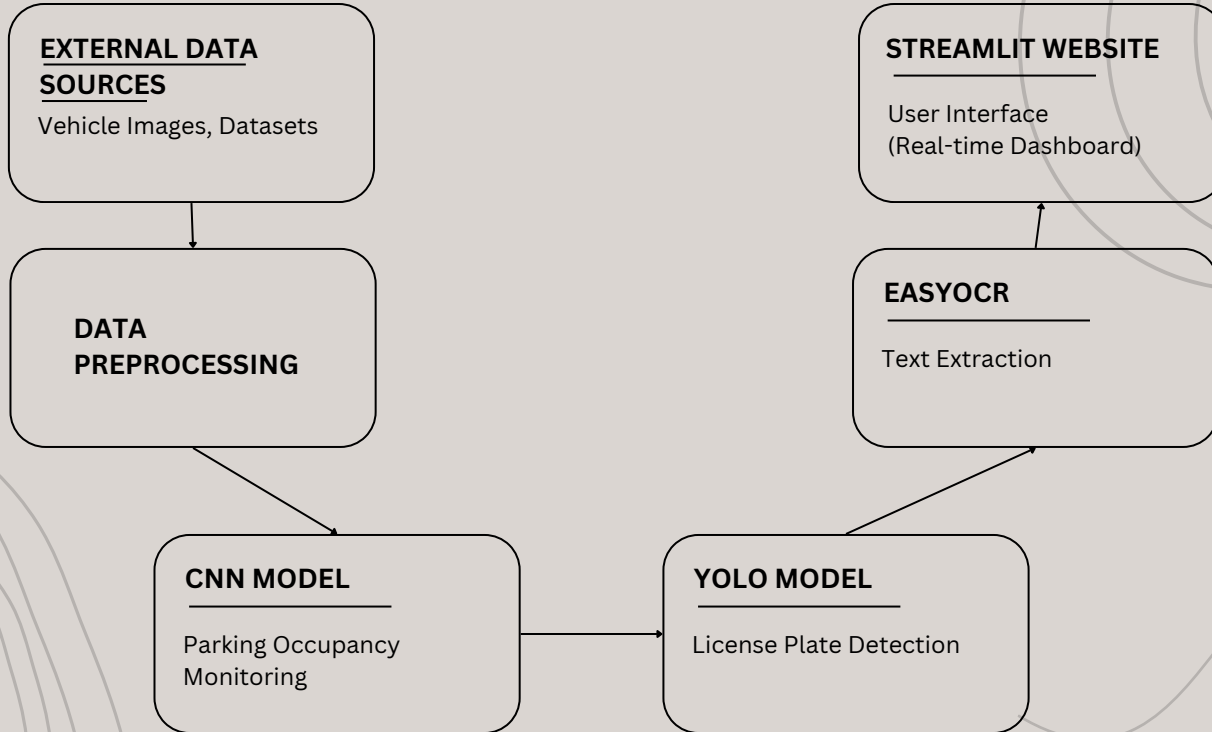
- Develop and deploy a CNN (Convolutional Neural Network) model for parking occupancy monitoring.
- Train the CNN model on parking lot images to detect and monitor parking space occupancy

Process Workflow

Streamlit Website Implementation:

- Create a Streamlit website to host the project.
- Design the user interface on Streamlit to display:
 - Real-time updates on parking occupancy status.
 - Detected license plates with extracted text.
 - Interactive features for user engagement and data visualization

Architectural Diagram



Technologies used

1. YOLO Model
2. EasyOCR
3. CNN (Convolutional Neural Network) Model
4. Streamlit
5. Python
6. OpenCV

Future Enhancements

1 Multiple Parking Lots:

Extend the system to cover multiple parking lots within the campus or across different campuses.

2 Authorized/Unauthorized Vehicle Detection:

Implement a system to compare detected license plates with a database of authorized vehicles to identify unauthorized ones.

3 Mobile App Integration:

Develop a mobile app for users to check parking availability and receive notifications about parking status.

Conclusion

In conclusion, the solution effectively addresses the challenges associated with managing parking and enhancing campus security through license plate detection. By offering real-time insights into parking lot occupancy and vehicle authorization status, the system improves campus safety and operational efficiency. This project demonstrates the practical applications of computer vision in campus security and management, providing valuable experience in developing intelligent, data-driven solutions.



**Thank
You**