Automatic License Plate Recognition

With smart IPM & Morphology Enhancement

Introduction

Automatic License Plate Recognition (ALPR) is a computer vision system that automatically detects vehicle license plates from images or video streams and recognizes the alphanumeric characters on the plates. ALPR is widely used in intelligent transportation systems, including traffic monitoring, parking management, toll collection, access control, and law enforcement. By automating vehicle identification, ALPR improves efficiency, accuracy, and scalability compared to manual monitoring.

Despite advances in computer vision, accurate license plate recognition remains challenging due to varying lighting conditions, motion blur, occlusions, plate angle distortions, different fonts, and low-resolution images. Traditional ALPR systems often struggle with real-world variability, leading to incorrect character recognition and reduced plate-level accuracy. Therefore, a robust ALPR system is required to improve detection and recognition performance under diverse conditions.

Dataset

Roboflow
(8788 images)
Train epoch:50

FLOW

1. Line segmentation
2. Plate segmentation
3. Implement IPM
4. Implement OCR

ALPR Pipeline

Input → Image Feed
Detection→YOLOv11
Filtration→Logic to remove false positives (lane check & Vertical sorting)
Preprocessing→Smart IPM (unwrap) + Morphology Open
Recognition → Easy OCR

Innovation

Smart IPM (Inverse Perspective Mapping)

Output

The model managed to detect license plates. However, it fails to correctly read all characters on the plate