The Harmonious Conductor in the City's Rhythm

FORUM8 12th CPWC

Harmony Watch

Introduction

In recent years, urban traffic accidents have occurred frequently. To ensure traffic safety, it is urgent to strengthen traffic management. We employ cutting-edge machine learning algorithms to capture and analyze urban traffic flow through high-definition cameras, monitoring vehicle speeds in real time to ensure driving safety. The core of the system lies in its high-precision license plate recognition technology, which can quickly identify and record information of vehicles that violate regulations. Additionally, the system intelligently recognizes no-parking zones and automatically marks illegal parking behaviors. The design of the entire system focuses on user experience, with an intuitive interface and easy operation, aiming to use the power of technology to restore and maintain the harmonious order of the city.

Background

Frequent traffic violations:
Urban transportation networks experience a high rate of traffic violations.

Reckless driving behaviors:
These violations are often caused by reckless driving, which negatively impacts road safety and efficiency.

Objective of the system:
Improve urban traffic management efficiency and enhance the safety of both pedestrians and drivers.

Traffic flow analysis:
It analyzes the traffic flow to monitor and optimize road usage.

Illegal Parking Detection:
Identify illegal vehicles in no parking areas.

License Plate Recognition:
Detect and record illegal vehicle license plates.

Vehicle Speed Measurement:
Measure vehicle speed and record speeding vehicles' feature.

Vehicle Re-identification:
Catch speeding vehicles by different cameras.

System Architecture

UC-win/Road 3D Scene Simulation

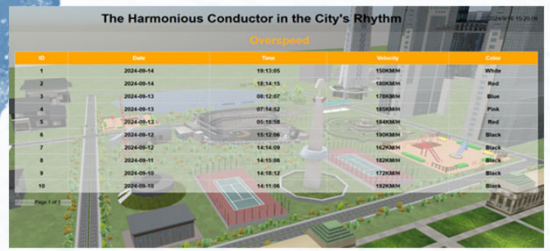
- Illegal Parking Detection Algorithm
- License Plate Recognition Algorithm
- Vehicle Speed Measurement Algorithm
- Vehicle Re-identification Algorithm

Algorithm Application

Database Storage

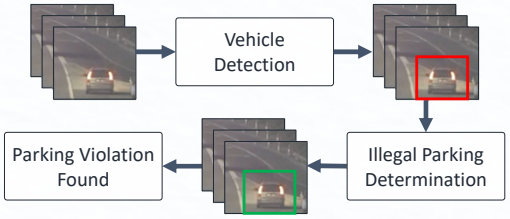
Web Screen Visualization

Algorithm



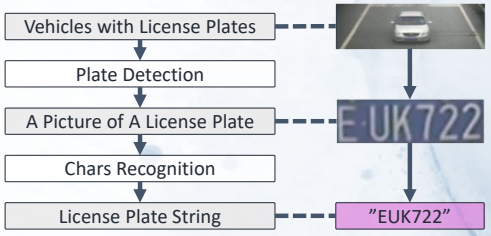
Illegal Parking Detection Algorithm

Vehicles parked illegally for a long time on a prohibited road section can be detected by the algorithm.



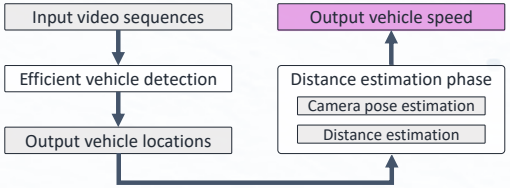
License Plate Recognition Algorithm

For vehicles that violate parking rules, the algorithm is used to recognize the license plate and assist the traffic police to punish.



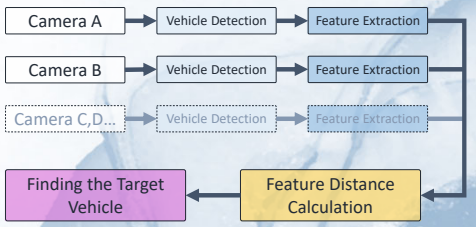
Vehicle Speed Measurement Algorithm

When the vehicle passes the camera, the position difference of the vehicle between adjacent frames is calculated, and then its velocity is calculated through the time interval.



Vehicle Re-identification Algorithm

When a vehicle is speeding, the feature information is recorded, and the vehicle is relocated at the highway toll station.



Future

Continuously optimize deep learning models to improve the accuracy of vehicle recognition and speed measurement.

Collaborate with urban planning departments to utilize system data for urban and transportation planning.

Utilize big data analysis technology to provide more in depth traffic trend analysis and prediction.