Real-Time Number Plate Detection System

A comprehensive overview of our real-time vehicle number plate detection system.

Introduction

This document details the design, development, and implementation of a real-time vehicle number plate detection system using computer vision and deep learning. It identifies and reads license plates from live video, storing them in a local database. Suitable for traffic surveillance, parking management, and security checkpoints.

Project Objectives

Real-time Detection

Detect license plates from video streams.

Text Extraction

Extract readable text using OCR.

Data Storage

Store plate numbers and timestamps in a database.

Efficiency

Develop an accurate, lightweight, and efficient system.

Tools & Technologies

System Architecture

1

Video Stream

Captured from webcam using OpenCV.

2

Detection Module

YOLOv5 detects license plate locations.

3

Cropping Module

Detected plates are cropped from the image.

4

OCR Module

EasyOCR extracts alphanumeric text.

5

Database Logging

SQLite stores plate number and timestamp.

6

Display Output

Annotated frame shown with bounding boxes and text.

Implementation & Results

Implementation

Step-by-step setup including package installation, model loading, database creation, and real-time detection loop using OpenCV and EasyOCR.

Results

- Successfully detected and read plates in real-time.
- Satisfactory accuracy for frontal/near-frontal plates.
- Stored logs allowed easy review of captured data.

Applications

Smart Parking

Entry/exit tracking for parking systems.

Traffic Enforcement

Law enforcement and surveillance.

Toll Booths

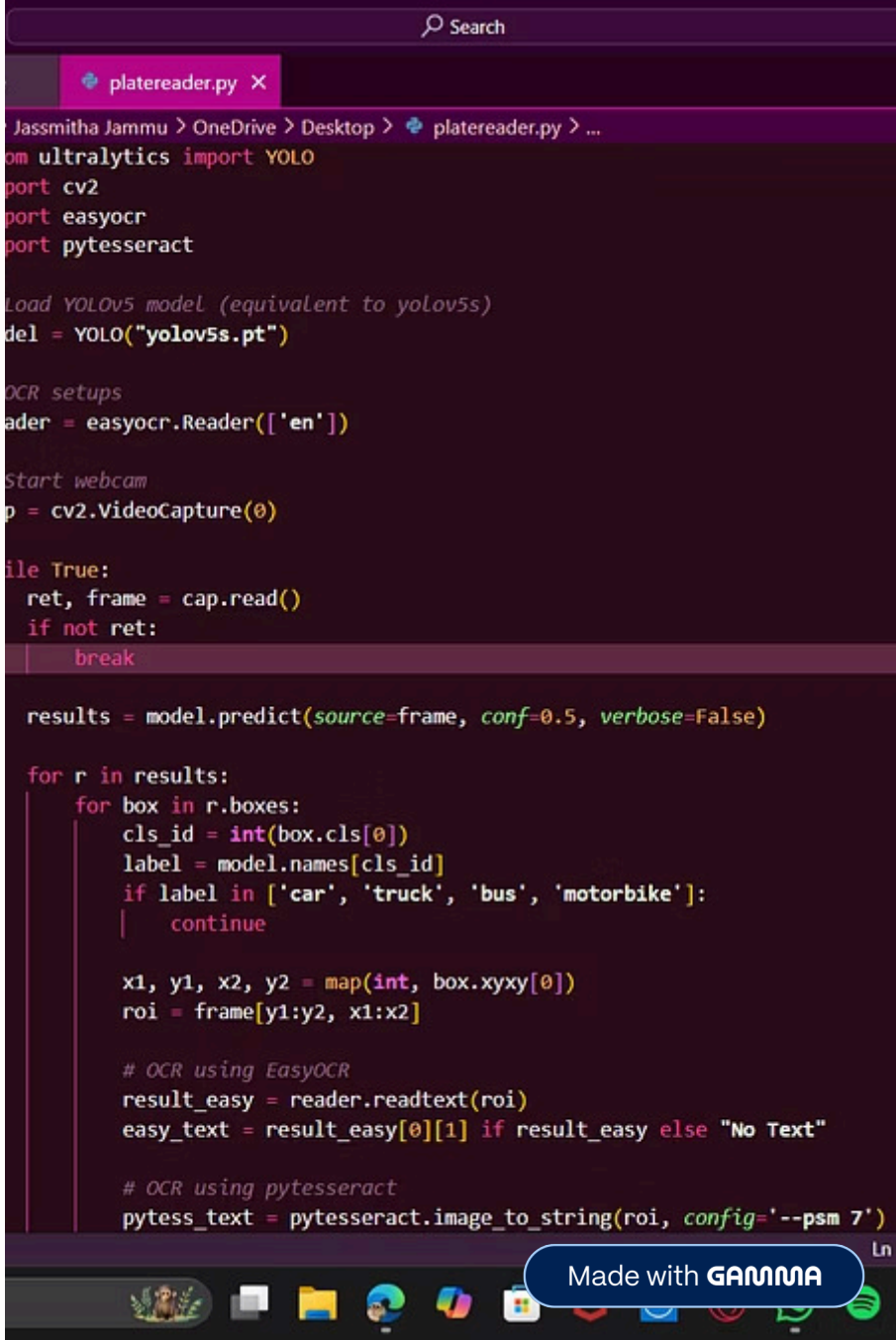
Automation of toll collection.

Gate Security

Enhanced security at private premises.

Future Work

- Integration with cloud database for centralized tracking.
- Night vision compatibility using IR imaging enhancements.
- GUI dashboard using Flask or Streamlit.
- Alert system for blacklisted vehicle detection.



Conclusion

This project demonstrates an effective, real-time solution for automatic number plate recognition using deep learning and computer vision. Its modular design and lightweight components make it a practical base for deployment in smart traffic and surveillance applications.

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