

Department of Information Technology

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Project Title:

“ Automatic Number Plate Recognition”

Project by:

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Submitted To:

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Subject:

Computer Vision

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Automatic Number Plate Recognition (ANPR) using YOLOv8

This project implements **Automatic Number Plate Recognition (ANPR)** using **YOLOv8** for real-time vehicle and license plate detection. The system detects vehicles, identifies their license plates, and extracts the text from the plates, generating a structured CSV output for further processing.

Project Workflow

1. Vehicle Detection

- Uses a **pre-trained YOLOv8n model** to detect vehicles in a video stream.
- Identifies vehicles such as cars, trucks, and motorcycles.
- Tracks vehicle movement using the **SORT tracking algorithm**.

2. License Plate Detection

- A custom-trained **YOLOv8 model** is used to detect license plates.
- Plates are assigned to their respective vehicles based on bounding box positions.

3. License Plate Recognition

- The detected license plates are **cropped, converted to grayscale, and thresholded** for better OCR performance.
- Optical Character Recognition (OCR) extracts the license plate number.
- The recognized plate text, along with its detection confidence, is recorded.

4. Data Storage and Processing

- The extracted data is **saved in a CSV file** (test.csv).
- Missing frames are interpolated for smooth tracking using `add_missing_data.py`.
- The `visualize.py` script is used to overlay the results on the video.

Technology Stack

- **Deep Learning Framework:** YOLOv8 (Ultralytics)
- **Computer Vision:** OpenCV
- **Tracking Algorithm:** SORT (Simple Online and Realtime Tracker)
- **OCR:** Optical Character Recognition for license plate reading
- **Python Environment:** Python 3.10, Conda

How It Works

1. Load YOLOv8 models for **vehicle detection** and **license plate detection**.
2. Process a video frame-by-frame.
3. Detect and track vehicles using **SORT tracking**.
4. Identify license plates and crop them for OCR processing.
5. Recognize text from license plates and store results in a CSV file.
6. Interpolate missing frames for smoother tracking.
7. Generate an annotated video with detected plates and vehicle IDs.

Usage Instructions

1. Setup Environment

```
conda create --prefix ./env python==3.10 -y
source activate ./env
pip install -r requirements.txt
```

2. Clone and Install Dependencies

```
git clone https://github.com/abewley/sort # Clone the SORT tracking repository
```

3. Run the Detection Script

```
python main.py # Generates test.csv with detected plates
```

4. Handle Missing Data (Interpolation)

```
python add_missing_data.py
```

5. Visualize Results

```
python visualize.py
```

Applications

Traffic Monitoring & Law Enforcement

Automated Toll Collection

Parking Management Systems

Fleet Management & Vehicle Tracking