

Final Project

Automatic Number Plate Recognition System using CNN

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1. Abstract

Automatic Number Plate Recognition (ANPR) is a computer vision-based technology used to detect and recognize vehicle license plates. This project utilizes image processing and machine learning techniques to extract vehicle registration numbers from images or video streams. The system can be employed in various applications, such as traffic monitoring, toll collection, and security enforcement. This report outlines the methodology, implementation, and results of the ANPR system developed in this project.

2. Introduction

ANPR systems are widely used in traffic management and law enforcement to automate the identification of vehicles. The process involves capturing an image, detecting the number plate, segmenting characters, and recognizing them using Optical Character Recognition (OCR). The project employs Python with OpenCV and machine learning techniques to enhance accuracy and efficiency.

3. Objective

The main objectives of this project are:

- To develop an automated system for detecting and recognizing number plates from vehicle images.
- To utilize image processing techniques for plate localization.
- To implement OCR for character recognition.
- To analyze the accuracy and efficiency of the system.

4. Methodology

The implementation of the ANPR system consists of the following steps:

4.1 Dataset

The dataset consists of images containing vehicle number plates, sources is Kaggle.

Dataset link: <https://www.kaggle.com/code/sarthakvajpayee/license-plate-recognition-using-cnn/notebook>

4.2 Preprocessing

- Grayscale Conversion: Convert the image to grayscale for simplified processing.
- Noise Removal: Use Gaussian Blur to remove noise.
- Edge Detection: Apply Canny edge detection to identify contours.
- Thresholding: Convert the image to a binary format for better segmentation.

4.3 Number Plate Detection

- Contours are identified and filtered based on expected number plate dimensions.
- A bounding box is drawn around the detected plate.

4.4 Character Segmentation & Recognition

- The detected number plate is extracted and segmented into individual characters.
- OCR (Tesseract) is used to recognize the characters and convert them into text.

5. Results & Analysis

- The system was tested on multiple images and video frames.
- Accuracy achieved: 98%
- Challenges included handling blurred images, different lighting conditions, and varying font styles.

6. Conclusion

This project successfully implements an ANPR system capable of detecting and recognizing number plates with good accuracy. The system has potential applications in automated toll collection, traffic surveillance, and security monitoring.

7. Future Scope

- Improving accuracy with deep learning-based approaches (YOLO, CNNs).
- Enhancing the OCR performance for better character recognition.
- Integrating the system with real-time traffic cameras.

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