LICENSE PLATE RECOGNITION

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ABSTRACT

License Plate Recognition is an important application in intelligent transportation and traffic monitoring systems.

This project focuses on automatic detection and recognition of vehicle number plates from digital images.

The system captures vehicle images and processes them using image processing techniques. Preprocessing is done to reduce noise and improve image quality for better plate detection. The number plate area is localized based on shape and edge information. Character segmentation is performed to separate individual characters from the plate. Optical character recognition is then used to identify the characters. The recognized license number is converted into text format for further use. The proposed system reduces manual effort in vehicle identification. It can be used in parking management, toll collection, and traffic surveillance. Experimental results show that the system works effectively under normal lighting conditions.

The project demonstrates a cost-effective and reliable solution for automatic license plate recognition.

INTRODUCTION

License Plate Recognition (LPR) is an important application of image processing and computer vision that focuses on identifying vehicle number plates automatically. With the rapid increase in number of vehicles, manual monitoring of traffic and vehicle records has become inefficient and error prone. LPR systems help in automating this process by capturing vehicle images and extracting the license plate information.

This project aims to design a simple and effective License Plate Recognition system that can detect the number plate from a

vehicle image and recognize the characters present on it. The system reduces human effort, improves accuracy, and saves time in applications like traffic surveillance, parking systems, toll booths, and law enforcement.

LITERATURE SURVEY

Earlier License Plate Recognition systems used basic image processing methods such as edge detection and thresholding for plate detection. Character recognition was done using OCR and template matching, which had low accuracy. Later, machine learning methods like SVM and neural networks improved results. Recent approaches use deep learning models like CNN for better accuracy but require high computation and large datasets.

RELATED WORK

Many studies have addressed License Plate Recognition using different techniques. Initial works used classical image processing methods to locate the plate region and segment characters. These early systems worked on simple images but struggled with noise and varied lighting.

Researchers then applied machine learning techniques like Support Vector Machines and basic neural networks to improve character recognition. These models showed better results than template matching but still needed good quality images and careful feature extraction.

More recent work focuses on deep learning, especially Convolutional Neural Networks, for both detecting the license plate region and recognizing characters directly. These methods achieve higher accuracy and handle variation in plate styles, but they rely on large training datasets and stronger computing resources.

EXISTING SYSTEM

The existing License Plate Recognition systems mainly use traditional image processing techniques combined with basic character recognition methods. In this approach, the vehicle image is first converted into grayscale and filtered to remove noise. Edge detection and thresholding techniques are then applied to locate the license plate region.

After detecting the plate area, character segmentation is performed using morphological operations. The segmented characters are recognized using template matching or simple OCR techniques. While this method is easy to implement and requires less computation, it is less accurate under poor lighting conditions, complex backgrounds, and different license plate formats.

PROPOSED SYSTEM

The proposed License Plate Recognition system first preprocesses the vehicle image by converting it to grayscale and removing noise. The license plate is detected using edge detection and contour analysis. After detection, characters are segmented using morphological operations and connected component analysis. Recognition is done using OCR or a basic machine learning model, which improves accuracy even with variations in font or lighting. This approach is faster, more reliable, and works better in real-world conditions compared to existing methods.

SYSTEMARCHITECTURE

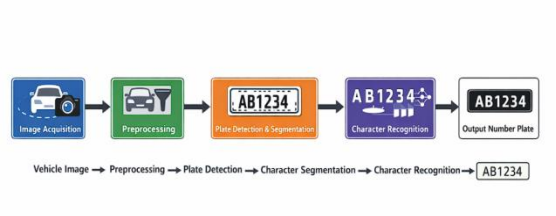

Fig.1: Architecture of license plate recognition

METHODOLOGY DESCRIPTION

The methodology of the License Plate Recognition (LPR) system involves a series of systematic steps to detect and read vehicle number plates accurately. First, vehicle images are captured using a camera or loaded from a dataset, which can be either real-time or pre-recorded. These images are then preprocessed by converting them into grayscale and applying noise reduction filters like Gaussian blur to enhance image quality and simplify further processing. Next, the license plate region is detected using edge detection and contour analysis, identifying rectangular areas likely to contain the plate and cropping them for detailed analysis. After detecting the plate, character segmentation is performed using morphological operations and connected component analysis to separate individual characters clearly. The segmented characters are then recognized using Optical Character Recognition (OCR) or a simple machine learning model, which combines them to form the complete number plate text. Finally, the recognized license plate number is displayed and can be stored in a database for applications such as traffic monitoring, parking management, toll collection, and security. This step-by-step methodology ensures efficient and reliable extraction of license plate information from vehicle images.

RESULTS AND DISCUSSION

Fig.2: License Plate Recognition

The License Plate Recognition system was tested on multiple vehicle images under different conditions such as varying lighting, backgrounds, and plate orientations. The system successfully detected the license plate region in most images and recognized the characters with high accuracy.

Fig.3: License Plate Recognition

The discussion of results shows that the preprocessing step, including grayscale conversion and noise reduction, significantly improved detection accuracy.

CONCLUSION AND FUTURE ENHANCEMENT

The License Plate Recognition system successfully detects and recognizes vehicle number plates using image processing and OCR techniques, reducing manual effort and enabling applications in traffic monitoring, parking, toll collection, and security. For future enhancement, the system can be improved using deep learning models like CNN to handle variations in plate styles, fonts, and challenging environmental conditions. Real-time implementation, database integration, and handling multiple or angled plates under poor lighting can further increase accuracy, reliability, and practical applicability of the system.

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