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Automatic Number Plate Detection System Using Python

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Abstract : In every nation, traffic control and identifying the owners of vehicles have grown to be serious issues. It might be challenging to recognise car owners who drive excessively fast and against the regulations of the road. Because the traffic officer or person may not be able to identify or recover the car number from the moving vehicle, it is impossible to catch and penalise those kinds of persons. This is as a result of the vehicle's speed. Therefore, one of the solutions to this problem is the development of Automatic Number Plate Recognition (ANPR) technology. There are several ANPR systems on the market right now. Despite the fact that these systems are based on many techniques, the challenge of identifying vehicles at high speeds, with non-uniform number plates, in languages other than English, and in diverse lighting situations is still quite difficult. The majority of the systems function with these restrictions. In this essay, we've talked about the Python-based ANPR system.
The system can recognize single and double line number plates under widely varying illumination conditions with a success rate of about 93%.

1. INTRODUCTION

The ANPR system is a method of mass surveillance, capturing images of vehicles and recognising their license numbers. Automated traffic control and tracking systems automate highway parking toll collection systems, automatic petrol pumps with automatic trip time monitoring are a few applications of the ANPR system. Some applications of an ANPR system are, automated traffic surveillance and tracking system, automated high-way/parking toll collection systems, automation of petrol stations, journey time monitoring.[1] Such systems automate the process of recognizing the security number plates of the vehicle and making the process fast, reliable and efficient.

1.1 EXISTING SYSTEMS

Automatic Number Plate Recognition (ANPR) is a technology that uses optical character recognition to read and interpret license plates on vehicles. There are various existing models and algorithms used for ANPR, including traditional computer vision methods and more modern deep learning approaches. Some popular models include the OpenA LNPR system, ALPR Net, and YOLO-based ANPR systems. These models are designed to accurately and efficiently extract text information from license plates for applications like law enforcement, parking management, and traffic monitoring. Keep in mind that the specific details and performance of these models may vary depending on the implementation and dataset used for training.

1.2 PROPOSED SYSTEM

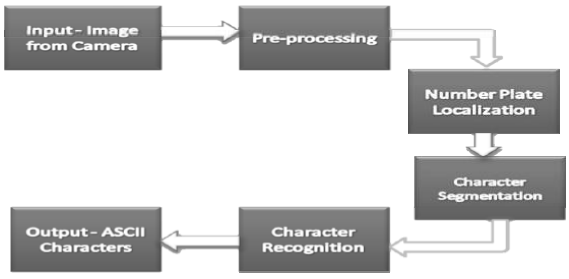

Figure 1: Software flow of the system

There are several steps that could be included in a proposed system for automatic number plate recognition (ANPR): Image capture: The first step in the process would be to capture an image of the vehicle's license plate. This could be done using a camera mounted on a fixed structure, such as a traffic light or a road sign. Image processing: The captured image would then be processed to extract the license plate information. This could involve a series of image processing techniques, such as segmentation, thresholding, and character recognition. Character recognition:[2] The system would use character recognition algorithms to identify the individual characters on the license plate. Data storage and lookup: The identified license plate number would be compared to a database of registered vehicles. If a match is found, the system would retrieve the relevant information about the vehicle and its owner. Alerts and actions: Depending on the application, the ANPR system might trigger an alert or take some action based on the information retrieved from the database. For example, in a law enforcement application, the system might alert the police if the vehicle is stolen or if the driver has a suspended license. In a toll collection application, the system might automatically charge the vehicle owner for the use of the toll road.

2. SYSTEM OVERVIEW

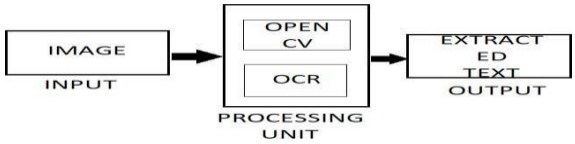

Figure 2: System Overview

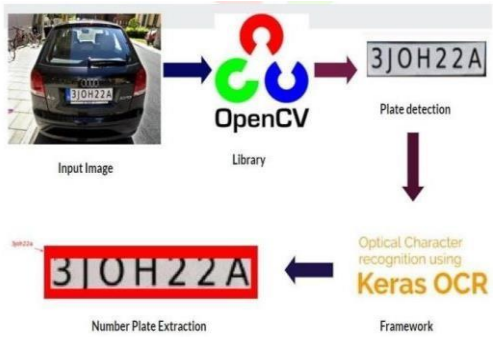

Figure 3: Pictorial Overview

Vehicle detection module detects the presence of vehicle by using inductive sensors in which metal wire loop is placed beneath the road. When a vehicle crosses the loop, there is change in induced current which detects presence of vehicle. As a result the DSP is interrupted and it triggers the IR camera to capture the image (fig. 2). The captured image is processed by DSP to recognize license number of vehicle by employing various image processing[3] algorithms, as mentioned earlier. The DSP gives the license number in ASCII format, using which all relevant details about the vehicle are obtained from a centralized database.

3. INPUT IMAGE

Providing the input data is the first step. These captured photos are in colored format, allowing for number plate extraction to run further.

Figure 4: Input Image

4. Pre- Processing and Number

Before doing the main image processing, the collected data image needs to go through preprocessing, which includes converting colored to gray, removing noise, and brightening the border.

Figure 5: Gray Scale

Figure 6: Blurred Image

5. Edge Detection

Here, we give the openCv programme the fig from above as input. It recognises every edge, as shown below.

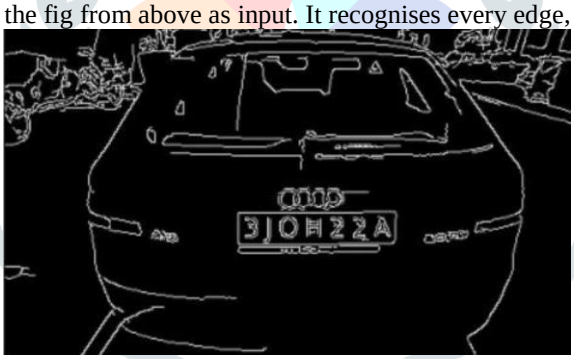

Figure 7: Edge Detection

6. Extraction of Number Plate

The following step is to trace contours to find rectangular edges. This receives the above data as input and outputs the result as shown below.

Figure 8: Extraction of Number Plate

7. Extraction of Characters

So, now that we have the needed licence plate, let's extract it as text as follows. First, we feed the aforementioned figure into the ocr. By obscuring the rest, it will be able to distinguish the text.

Figure 9: Text Detect

Figure 10: Text Extract

8. Experiments and Testing

The system was tested with a set of images not used during testing, having wide variations in illumination conditions. The complete recognition process takes an average of 2 seconds. This can be further improved by optimizing the code. If cases where the number plate script is non English or the number plate is badly distorted are excluded then, 82% of the plates were recognized correctly. The performance of individual sections is: 87% for number plate localization, 95% for character segmentation and 85% for character recognition.

9. Conclusions and Future Research

There are several areas where future work could be done to improve automatic number plate recognition (ANPR) systems: Improving accuracy: Researchers are constantly working to improve the accuracy of ANPR systems, particularly in challenging conditions such as low light or when the license plate is partially obscured. Enhancing security: ANPR systems handle personal data, so it is important to ensure that the systems are secure and that the data is protected from unauthorized access. Increasing efficiency: Researchers are also working to make ANPR systems more efficient, so that they can process vehicles more quickly and at a lower cost. Expanding applications: ANPR systems have a variety of potential applications, including law enforcement, toll collection, and traffic management. Future work could involve exploring new applications for ANPR technology. In conclusion, ANPR systems are useful tools that can help authorities identify vehicles and their owners quickly and accurately. While there are challenges to be addressed, such as accuracy and privacy concerns, the technology has the potential to improve road safety and facilitate[4] the efficient operation of transportation systems.

References

[1] Singh, A. K., & Roy, S. (2015). "ANPR Indian system using surveillance cameras",2015 Eighth International Conference on Contemporary Computing(IC3).

[2] Rahim Panahi and Iman Gholampour "Accurate Detection and Recognition of Dirty Vehicle Plate Numbers for High-Speed Applications",IEEE Transactions on intelligent transportation systems, vol. 18, no. 4, april2017.

[3] Sourav Roy, Amitava Choudhury, Joydeep Mukherjee.," An Approach towards Authorized licensed use limited to: Bahria University. Downloaded on November 03,2023 at 07:09:37 UTC from IEEE Xplore. Restrictions apply. Detection of Indian Number Plate from Vehicle" International journal of Innovative Technology & Exploring Engineering(IJITEE)Volume-2, Issue-4, March 2013.

[4] Exploring Engineering(IJITEE) Volume-2, Issue-4, March 2013 Shan. Du, Mohamed. Shehata, Wael. Badawy, "Automatic License Plate Recognition(ALPR):A – state – of – the – Art Review" IEEE Vol. 23, No.2, June 2013.