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AUTOMATIC NUMBERPLATE RECOGNITION

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Abstract - *The goal is to create a system that uses the car number plate to create an efficient automatic approved vehicle identification system. It can be installed at the entrance to a highly restricted region, such as military zones or the area around major government facilities, such as Parliament and the Supreme Court. The algorithm created here is designed to be lightweight and operate in real time. Under typical circumstances, the system will be able to detect the number plate using photos given by a USB web camera.*

The method is divided into three sections: the first detects a number plate using picture edge and intensity data; the second locates the number plate's text; and the third does real character recognition. Character recognition is done using an optical character recognition approach. The generated information is then compared to database entries. The system's main benefits are its real-time capabilities and the fact that it doesn't require any extra sensor input (for example, from infrared sensors) aside from a video stream. In Matlab, the system is developed and simulated, and its performance is evaluated using real images. The created system successfully detects and recognizes the car number plate, according to the results.

Key Words*: *image processing, preprocessing, filtering, feature extraction, segmentation, recognition, experiment

1.INTRODUCTION

There is a need for information systems for data processing in automobiles as a result of the widespread integration of information technology into all parts of modern life. These systems necessitate the archiving of data by a person or a specific team capable of recognizing automobiles by their license plates in real time and reflecting the realities of reality in the information system. As a result, numerous approaches and identification systems have been developed, and license plates are now employed in a variety of applications. Vehicles are often identifiable by their license plate numbers, which are legible by people but not by machines. . For machines, a registration number plate is just a dark spot that is within a region of an image with a certain intensity and luminosity. Because of this, it is necessary to design a robust mathematical system able to perceive and extract what we want from the captured image.

These functions are implemented as mathematical patterns in "ANPR Systems" (Automatic Numbers Plate Recognition) and represent a shift between how the actual world is observed and the information systems that must store and manage it. In fields like Artificial Intelligence, Computer Vision, Pattern Recognition, and Neural Networks, one of the topics of research is the design of these systems. Automatic license plate recognition systems are hardware and software systems that interpret a signal translated into a graphical representation, such as static pictures or sequences of them, and recognize the letters on the plate. A camera, an image processor, an event logger memory, and a storage unit, as well as connectivity, make up the core hardware of these systems.

2.MOTIVATION

The real-time capabilities of our system in city settings, as well as its capacity to function in daytime conditions with ample sunshine or artificial light from street lamps, set it apart from all others. Because the light is solely reflected by the license plates, active infrared light is widely used. The identification of the plates and subsequent character segmentation is reasonably simple when utilizing a camera and specific filters. The use of alternate light sources, on the other hand, incurs additional expenditures. As a result, one need during system design was to create a system that could be deployed and established in a short amount of time using standard off-the-shelf video cameras and without extra illumination.

The unavailability of a digital camera with a high-speed shutter is the primary reason for our concentration on automobiles travelling at residential speeds. When cars are driving at high speeds, the disadvantage of employing ordinary TV cameras is that motion blur is a major issue, making decent character identification nearly impossible. It's worth noting that this is more of a limitation of the picture acquisition equipment than a system flaw. Our solution is self-contained and works on a smart camera, allowing it to be integrated into an existing system, such as a parking garage access control system.

3.PROBLEM STATEMENT

First, the license plate region must be located and extracted from a broader scene image. Second, after you've got a license plate region to work with, you'll need to remove the alphanumeric characters from the backdrop. Deliver them to an OCR system for recognition in the third step. It is evident that in order to correctly identify a car by reading its license plate, the plate must be located in the scene image given by some acquisition system (e.g. video or still camera). Locating

the region of interest reduces both the computing cost and the complexity of the procedure.

A typical 1024x768 resolution image, for example, has a total of 786,432 pixels, although the region of interest (in this case, a license plate) may only take up 10% of the image area. In addition, the input to the subsequent phases of segmentation and recognition should be streamlined, resulting in easier algorithm design and faster computing times.

4.PROPOSED SYSTEM

The goal of this research is to provide innovative methods for extracting license plates. The suggested approach is based on video capture, plate region extraction, plate character segmentation, and character recognition. Plate extraction is a challenging process. A simple license plate extraction method is described in this project. The approach is based on the Edge Detection algorithm, which includes four primary stages: RGB to gray-scale conversion, Gaussian Blurring, morphological processes, and recovering the license plate's precise location. For character recognition, the mean squared error approach is utilised.

4.1 PROPOSED METHODOLOGIES

• Video acquisition

• Gaussian Blur

• RGB to gray scale conversion

• Localization

• Character segmentation

• Character recognition

5.OBJECTIVE

Within the License Plate Identification framework, the major goal of this research project is to experiment extensively and develop alternate solutions to picture segmentation and character recognition challenges. The goal is to create a Python system that can detect and recognize automobile license plates.

• Find a method that produces acceptable results for determining the correct position of the license plate area.

• Create a system that derives the characters of a license plate based on a video frame's location.

• Using the mean squared error approach, recognize each character we retrieved above.

6.SYSTEM ARCHITECTURE

The structure, behaviour, and viewpoints of a system are defined by the system architecture, which is a conceptual model. The architectural design for the Automatic Number Plate Recognition (ANPR) system is shown below. An automated number plate recognition (ANPR) system scans and processes video containing a vehicle number plate as input and recognizes the number plate as output.

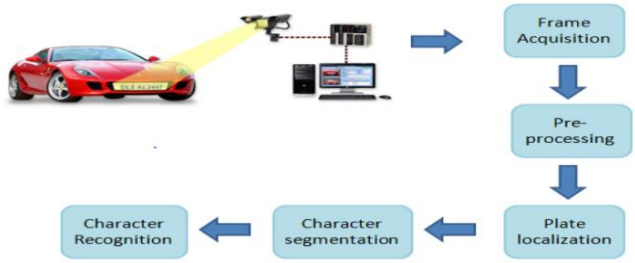

FIG 6.1 SYSTEM ARCHITECTURE

6.1STEPS

IMG taken from the video

Number plate detection using yellow search algorithm

Number plate extraction

Binary image

Inverted binary image

Character representation using column segmentation

Recognition Of the number on the plate

6.2 FLOWCHART

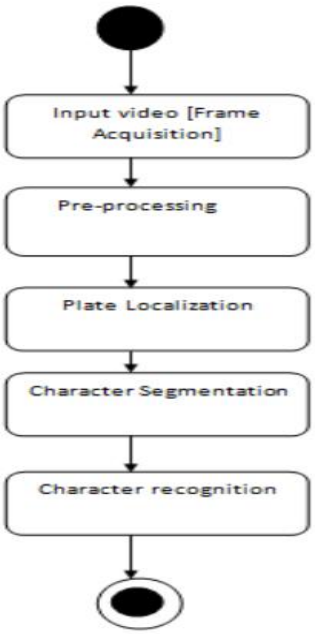

FIG 6.2 FLOWCHART

7.METHODOLOGY

To reduce the noise we need to blur the input Image with Gaussian Blur then convert the it to grayscale.

Find vertical edges in the image.

Binarizing the picture is required to disclose the plate. Apply Otsu's Thresholding on the vertical edge picture for this. Other thresholding methods need us to specify a threshold value in order to binarize the picture, whereas Otsu's Thresholding does so for us.

Apply the Closing Morphological Transformation on the picture that has been thresholded. In a thresholded picture, closing is beneficial for filling tiny black spots between white sections. It exposes the license plate's rectangular white box.

To recognize the characters on license plate precisely, we have to apply image segmentation

After binarizing the picture, use the bitwise not operation to discover the image's related components so that we can extract character candidates.

Now discover all of the contours in the character candidate mask and extract those contour regions from the value thresholded picture of the plate; you'll receive all of the characters individually.

8.CONCLUSION

We have presented a real-time license plate detection and identification system in this work. Without any additional sensor input, the system functions on picture frames captured using ordinary video equipment. The system's excellent performance allows it to compensate for the poor picture resolution by taking into account the classification results of following frames. ALPR applications like automatic toll collection, automatic charging system in parking spaces, management vehicles in parking spaces, and traffic monitoring, etc., have posed new research tasks in ALPR with newer dimensions. We have developed a software for automatic license plate recognition by taking inputs from live video feed. Character segmentation has been implemented on extracted number plates. Finally, segmented characters are recognized by using mean squared error method.

9.FUTURE WORK

The suggested system's implementation may be expanded to recognize numerous vehicle number plates in a single picture frame. For traffic surveillance management systems, user-friendly Android applications may be designed. Character recognition may also be done with the help of various deep learning algorithms, which are more accurate. In terms of computing time, GPUs may be employed to produce better results.

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