LICENSE PLATE RECOGNITION

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Abstract - *Every country has faced difficulties with traffic control and identifying vehicle owners. A driver driving too fast or violating traffic rules can sometimes be challenging to identify. Because of the speed of the vehicle, traffic officers might not be able to identify the vehicle in order to catch and punish people who commit such offenses. As one of the solutions to this problem, we need the development of the License Plate Recognition (LPR) system. Image processing techniques are used to identify the number plates of the vehicle. Character recognition is a four-step process that includes capturing the image from a digital camera, pre-processing, segmentation, and recognition of characters. Python is used to implement the system, and real images are used to test its performance.*

1. INTRODUCTION

License Plate Recognition[LPR] is an important technology for detecting a vehicle's plate number. LPR Systems recognize the characters present on the number plates of vehicles based on images of the plates, which are then processed to process further information. For instance, they can be helpful in finding missing vehicles or vehicles involved in crimes and also to know about Vehicle owner's information. Typically, a license plate recognition system uses a picture as an input, the output displays the characters usually as text. This system consists of a camera to capture the images of the vehicles. License Plate Recognition system allows system users to scan 100s of license plates in less duration of time. LPR is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed. It is also used to electronically collect tolls on toll roads and as a method of cataloging traffic movements, for example by road agencies.

1.1. LITERATURE SURVEY

[1] License Plate Recognition System Shally Gupta. The License Plate Recognition (LPR) system has been proposed for Ghanian license plates that are used for conveyance based on plate characteristics and variation. Edge detection and matching algorithms are the two candidate detection algorithms used for this ANPR design model. After detection, the next step is character segmentation, which prevents noise, character skewing, and character arrangement issues. Finally, the character recognition was conducted using a tesseract OCR engine.

[2] M. M. Shidore," Number Plate Recognition". This paper presents an algorithm for extracting vehicle number plates, segmenting characters, and recognizing them. Various variations of size, background, illumination, camera angle, distance, and other attributes make up the image database. Number plates can be extracted faithfully with an 85 percent success rate by using vertical edge detection and connected component algorithms. Character segmentation is effective with an 80 percent success rate based on connected component analysis and vertical projection analysis. Recognizing characters has a success rate of 79.84 percent.

[3] Aniruddh Puranic, "Number Plate Recognition System" Vehicle ownership has become a necessity in urban India because of its growing affluence. Traffic controlling issues have resulted from this unanticipated event. Several aspects of their application are reviewed in this paper. It was found that the ANPR system is 80.8% accurate for Indian plates when using template matching.

[4] "Number Plate Recognition Using Template Matching," by Nighat Naaz. We propose in this research to recognise characters on a car license plate. License plates may be identified based on their characters using template-matching. This technique takes a picture of a license plate as input and then performs pre-processing procedures to reduce noise. Grayscale conversion, dilation, erosion, and convolution are some of the phases involved. The next step is to use linked components to segment the characters. After the characters have been split, matching templates to them is used to recognise them. Based on their relationships, the templates are matched with segmented characters. A text file displays the number and character detected from the input picture in the last stage.

[5] Automatic Number Plate Recognition System (ANPR). Sahar S. Tabrizi explains a technique for License plate acknowledgment frameworks that expands the exactness and lessening of frameworks. k- Nearest Neighbors calculation and Multi-Class Support Vector Machines (KNN-SVM) are the algorithms used here. K-NN is used as the primary characterization display as it is basic. Comparative characters issue has been overcome by utilizing the various SVMs characterization display.

[6] Riazul Islam, Satyen Biswas. The authors of this paper presented an effective method for identifying vehicle number plates. To improve the object area, a semantic operation based on several groupings is applied to infer the locality of a region, which ultimately prevents non-interested

regions from being included. Simulated results will demonstrate the major improvements over other current systems since this system is adapted using a database of number plates.

[7] Muhammad Tahir Qadri's (author) goal is to create an effective approved vehicle identification system based on the vehicle number plate. The system is installed at the entry to a highly restricted region, such as military zones or areas around major government facilities, such as Parliament and the Supreme Court. The created technology will first detect the car before taking a picture of it. Picture segmentation is used to extract the vehicle number plate portion of an image. Character recognition is done using an optical character recognition approach. The obtained data is then compared against database entries in order to determine the specific information.

[8] Byung-Gil Han's automated license plate identification approach for high-resolution movies is demonstrated in real-time. Since the 1970s, substantial research has been conducted on the detection of license plates. The approaches presented in the research, on the other hand, are ineffective for analyzing high-resolution imagery in real time. Using a new cascade structure, this research presents the quickest classifier by effectively discarding false positives. We train the classifier utilizing the fundamental patterns of several types of license plates to increase both the computation load and the accuracy of license plate detection. The advantage of our technique is demonstrated by comparing several approaches. In compared to existing state-of-the-art methodologies, the suggested method minimizes computing effort while maintaining equivalent accuracy.

[9] The author(Shally Guptha) presented a Mask-RCNN and Yolov2-based three-stage license plate recognition system. To identify the license plate number and position, Yolov2 is used twice in phase 1 and 2. Phase 2 involves capturing a 19x19 grid picture. The Mask-RCNN is used in the last phase for character recognition. The map rating was 91 percent as a consequence of this model, and it was able to categorize vehicle number plates with bevel angles of 0-60 degrees.

[10] This study discusses character recognition as well as the process of converting a picture to text format by recognizing the image. Almost all number plate recognition algorithms employ a single mechanism for character recognition. Character segmentation and recognition are acquired at the same time in this approach. The system divides the image into parts, and the segmentation procedure divides the words into segments, each of which must be letters, and each segment is handed to a classifier.

2. PROPOSED SYSTEM

LPR recognition requires a number of difficult tasks, including detecting, segmenting, and recognizing number plates. Processing photographs of registration plates at varying angulation angles or photos of plates with noise becomes more difficult as these activities grow more demanding. Because it is a common problem, its use in real-time systems requires accuracy, but also speed. Furthermore, the processing is rapid.

Image Acquisition:

A camera that can take infrared photos and is enabled by ANoIR. This camera can also capture video in 1080p30 and 720p60 resolutions, which is great quality. A camera setup that captures photos with just 640x480 pixels can be employed to reduce the computing strain on the system. A sample image is preloaded to check and test the algorithm before starting to test the system with a " real - time " image, as illustrated in Figure 1.

Fig 1: Image Acquisition

Desaturation:

A colour image is turned to a grayscale image via image desaturation. OpenCV is virtually flawless at converting colour images to grayscale, and the importance of this capability is shown.

Thresholding:

Thresholding is a technique for converting a grayscale image into a two-plane image. Edge detection is made easier with this image. It does not identify the principal items, but rather isolates them from the background in order to extract the data we need. When it comes to thresholding, it's critical to choose the right value for the threshold that will best identify a pixel as an object or a background. To do this, we use OpenCV's Threshold.

Fig 2: Threshold image

Gaussian Filter:

To remove visual noise and excessive information, the Gaussian function is utilised. This Gaussian capacity obscuring's smooth haze resembles surveying the image through a velvet or transparent screen. In computer vision computations, the Gaussian filter is frequently used as a pre-handling stage to improve visual structures at various scales. Morphological change examines a picture's geometrical structure by putting small examples called as structuring components to the test. As a consequence, a nonlinear image operator has been developed that may be utilized to study geometrical and topological structure.

Fig 3: Gaussian Filter

Segmentation:

The process of locating and recognising the various symbols on a licence plate. Following morphological changes, two pieces were identified, as shown in the figure below. The fragment will then be separated into a square-shaped image, and it will be examined in order to find the longest list of possible characters and settle on the most likely real number plate. The last image with the most possible characters in it will be chosen to proceed through the character recognition technique after that. The effect of division on an image is seen in Figure below.

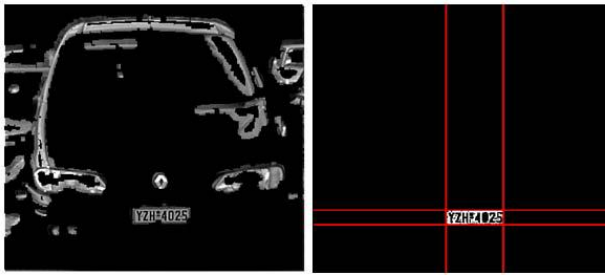

Fig 4: Segmentation

Recognition:

The plate number is compared to a database to recognize the characters.

Fig 5: Recognition

Algorithm for Logic Implementation

The working of ALPR system consists of the following steps:

Step 1: Get the frames of a real-time picture.

Step 2: Prepare each frame for use.

Step 3: Using the aspect ratio, do plate localization on the pre-processed frame.

Step 4: Separate the license plate's characters.

Step 5: Using the segmented characters, perform character recognition and show the results on the terminal.

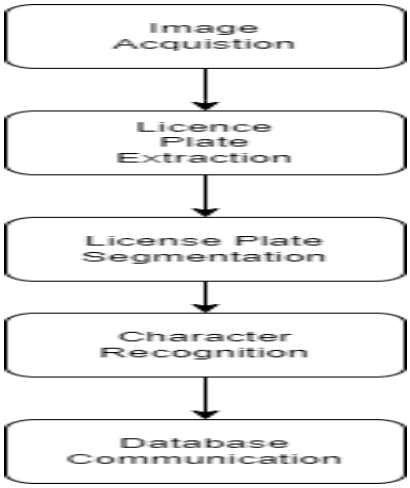

Fig 6: License Plate Recognition System.

3. CONCLUSION

The results of the License Plate Recognition system are obtained by analysing several metrics for the identification of a certain set of characters and digits, such as recognition of individual characters and digit success rates. The system will be tested on static images of the vehicle. Testing the invariance of the algorithms on random images that were classified to the sets according to their properties is not meant to find a set of snapshots that are 100% recognizable.

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