Fancy Number Plate Detection System

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Abstract: The goal of fancy number plate detection is to identify the format and pattern of the vehicle number plate. The vehicle identification number and passing information are found on the number plate. We want to develop a system that can recognize license plates and the format of such plates as set forth by the government and RTO. Utilizing number plate recognition, we take a picture of the vehicle's license plate and process it to determine whether or not the plate is legitimate per RTO regulations. Additionally, it has numerous potential future applications for reducing criminal activity, such as vehicle theft. Our goal is to create a robust and dependable product.

Keywords: Image Processing, Number Plate Recognition, Character Segmentation, RTO.

I. INTRODUCTION

A fancy number plate recognition system uses optical character recognition technology. A vehicle's registration number must be visible on both the front and back sides according to the law. Modern Arabic numerals and Latin letters must be used on all license plates. In a nutshell, a vehicle's registration number must be legible and obvious. The number plate of a car is not an exception, though, as Indians love to paint everything we own. Vehicles with two wheels and four wheels are often employed in violent crimes such kidnapping, murder, molestation, and chain or cell phone snatching.

Officials have noted that one commonality in these crimes was the use of a car with a flashy license plate to elude the police. The previous ten years have seen a rise in traffic violations and traffic become one of the most critical concerns in any nation. A large number of cameras are dispersed across the streets of cities and their surrounding areas to regulate traffic flow. In order to identify automobiles and their license plates from the instantaneous images that these cameras capture of the moving traffic, clever software is required.

The plate with the characters is divided into sections. The technology is made to convert grayscale photos for the purpose of detecting the license plate independent of color. By applying template matching, characters from the car number plate are separated. The entering picture is trimmed to remove any white borders and gaps. The kind of the vehicle number plate may be determined by comparing the results to the numbers that are stored in the database. Along with providing customers with information regarding passing time and passing date, the database also keeps data to keep track of the vehicle's records.

II. LITERATURE REVIEW

A S Mohammed Shariff, Raghav Bhatia, Raghwendra Kumar, Sarthak Jha [1], proposed an efficient method for the number plate of the vehicle to be detected through OpenCV. Through bilateral filter the image taken as input was tested and processed under various operations. After processing the cropped image automatically gets save into the folder called cropped licensed plate in which the text from the image is converted to the string. After that tesseract is implemented for reading the text on the image which the output is displayed on the python terminal. The author mentioned that the code worked properly on the images whose number plate has white background color and the method failed on the images having noisy background.

Mahesh Babu K, M V Raghunadh [2], This method is being considered for the purpose of identifying automobiles with valid license plates. The license plate position is recovered using edge detection, followed by segmentation of each character individually. First, we choose the picture, reduce noise, and locate the interested area of the image. In the end, the number plate characters are recognized using the correlation technique in conjunction with the template matching approach.

Amitava Choudhary, Alok Negi [3], This work proposes a zone-based license plate recognition method, using an adaptive template matching mechanism to identify the numbers. The light effects on the captured photographs are used to split them into several zones, and it is then possible to distinguish the real location of the license plate from other textual effects. For accurate recognition, the impact of edge detection and segmentation on each number and letter independently has also been examined. Experimental findings and a graph demonstrate the effectiveness of the suggested technique.

Prof. M.V. Sadaphule, Kshitij Patil, Aniruddha Patil, Kunal Waghmare, Supriya Nikale [4], This study has several practical implications, including automatically recognizing cars in parking lots, controlling access to restricted areas, and identifying and authenticating stolen cars. The speed and accuracy of a license plate detector are dependent on the quality of the algorithms utilized. Several methods for finding the plate using visual image processing have been put forth in the past. The supplied image's number plate region has been found and separated. Prior to this stage, the image must be pre-processed because the image's quality is crucial. Therefore, the first image is preprocessed by turning RGB into Grayscale, utilizing Gaussian blur for noise reduction, and edge detection. Then, using a separate image processing approach, the license plate is found.

Kuntal Bhowmick, Subhojit Roy, Deepak Kumar Jha [5], This research proposes a method for detecting car license plates on complicated images that is effective and takes less time. Here, the Sobel edge detection method is used to find edges and fill in only gaps less than 8 pixels. To extract the license plate, we cut out any related elements that are smaller than 1000 pixels in size. Our suggested approach is mostly based on the Indian system of vehicle number plates. For images with low ambient light, the accuracy of number plate extraction may be increased.

Chirag Patel, Dipti Shah, Atul Patel [6], Today, a variety of ANPR technologies are accessible. Although these systems use many approaches, it is still a difficult work since several elements, such as a vehicle's rapid speed, non-uniform number plate, language of the number, and changing lighting circumstances, can have a significant impact on the overall identification rate. Under these restrictions, the majority of the systems function. This article offers a thorough examination of current research in ANPR as well as predictions for its future tendencies. This information will be useful to scholars working on related projects. Using image size, success rate, and processing time as factors, various ANPR methodologies are presented in this work. An ANPR expansion is suggested at the paper's conclusion.

III. METHODOLOGY

There are different blocks in the proposed system to define how the system works.

1. **Real-time Image Captured by Camera:** The picture of the vehicle is collected by a CCTV or camera for later image analysis. The camera is positioned such that it can read the vehicle and record an image of it. To do that, we must designate the picture to the system as an input image for processing over an input image.

2. **Detect the Vehicle number plate from the Captured image: We** must utilize an input picture as an input for license plate detection from images. We also assign a number plate function for the purpose of detecting license plates.

3. **Segmentation of the characters:** These techniques use character segmentation, where we separate each character on a license plate into its component numbers and characters to determine the pattern of those characters. We also run character recognition.

4. **Recognition of each character:** These techniques use the number plate that we have derived from the image and license plate to recognize characters. Using OpenCV and optical character recognition, we use each character from an image.

5. **Comparing from Trained Model:** These methods allow us to specify whether or not the number plate complies with RTO regulations. Assigning data to learned data—such as font size, font color, and background color—allows us to compare it to input data and determine if it is genuine or not. Additionally, we determine if the license plate is in our database or not.

6. **Penalty from RTO:** If the license plate does not comply with RTO regulations, we apply a fee using this manner. If a fancy number plate is found, the owner will receive a challan at the location or phone number supplied during car registration. The owner must then alter the vehicle's number plate in accordance with RTO regulations and pay the challan within 7 days.
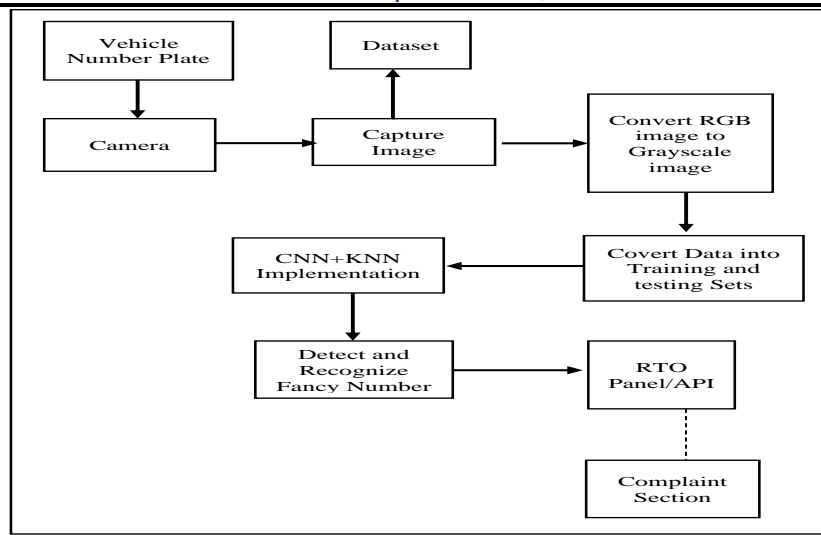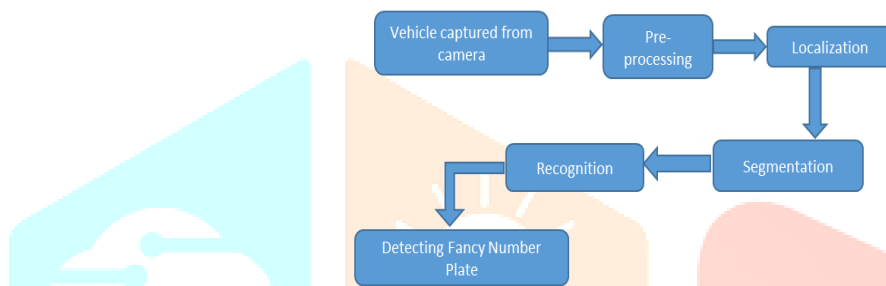
Fig 1: Basic Working Model

Fig 2: Block Diagram

- **Camera:** For recognizing any real time image a camera is important. A camera will be fixed on the road for capturing the car and detect its number through the implementation.
- **Vehicle Number Plate:** Hence, many citizen are not aware of the law that the designed or fancy number plates are out of law. To make them aware of the law our project will first detect the number plate captured by the camera.
- **Dataset:** All the data related to Cars and number plates are uploaded withing the two sets named as training set and testing set. As the main aspect is to recognize the characters on the number plate and to recognize the design of the number plate with the valid and legal number plate.
- All the datasets are used to get the Unstructured values from the captured Image frames.
- **RGB to Grayscale:** Each image Captured form the camera will get resized and cropped to process well. Then the image with RGB features will be converted into the grayscale image to recognize its contours and edged using the canny edge method.
- **CNN:** All the recognized characters and images will be compared and processed by using the CNN algorithm.
- **KNN:** KNN algorithm is used to predict the nearest predictions of the characters and images to gain the accuracy.
- It is responsible for converting each bounded frame to its equivalent character.
- **RTO Panel:** On the API of the RTO Fancy number will be detected and automatically suspect the challan on the registered email or phone number as convenient.

IV. FACILITIES REQUIRED FOR PROPOSED WORK

1) Software:

Operating System: Windows 11
Programming language: Python
Tool: Jupyter Notebook
Technology: Natural Language Processing

2) Hardware:

Processor: Ryzen 7th Generation
RAM: 8GB or more
Hard disk: 512 GB (minimum)

V. APPLICATIONS

A new technique for detection of the number plate with various designs and illegal format used by RTO. The decorative licence number plates for automobiles are not permitted under Indian motor vehicle legislation. It is illegal to use any elaborate designs, fonts, symbols, names, or images.

VI. CONCLUSION

The police department's manpower will be reduced by the system's ability to identify exotic number plates. Using the number plate, it may also provide the owner's details. There is a camera in this system that is made particularly for ANPR. The owner will receive a challan and have seven days to pay it if the expensive number plate is found. For the purpose of program cost charge assortment, we presented a continuous and efficient method for Vehicle Number Plate recognition.

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