

Vehicle Number Plate Recognition System to Identify the Authenticated Owner of Vehicles

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Abstract--- *Automatic Number Plate Recognition (ANPR) is the primary source of Vehicle Number Plate Recognition System. Number Plate Recognition system is a security system, which plays a significant role in identifying the owner of a vehicle. In case of suspicion, the traffic policemen verify the license copy and other documents related to the vehicle. As it is time consuming and difficult, the Number Plate Recognition system is suggested in this paper. The images of the number plate of the vehicles are scanned and stored in a repository in the system along with the information of the owner. When a suspected vehicle is scanned by the policemen, it generates One-time password to the owner of the vehicle. Once it is processed, the information about the vehicle and the owner will be displayed. Thus, it helps to identify whether the vehicle is used by the authenticated user and thus helps to find the vehicles that are stolen. ML Kit algorithm is used for implementation process.*

Keywords--- *Automatic Number Plate Recognition, Vehicle Number Plate Recognition, Image Processing, ML Kit, Vehicle Theft.*

I. INTRODUCTION

Vehicle Number Plate Identification (VNPI) is generally used in identifying and categorizing the vehicles. Number Plate recognition systems are being used for various purposes like traffic maintenance, to trace the stolen cars and in toll gates for automatic electronic toll collection system. Image Processing algorithms are used for number plate detections and segmentation algorithm is used to implement VNPI system. After the image of the number plate, more accurate and effective segmentation of number plate will produce virtuous and more efficient recognition. Hence, this technique is used in this paper to control the theft of vehicles. By capturing the image of the vehicle, the information about the original owner of the vehicle can be identified.

II. RELATED WORKS

This section shows the related works that has been carried out by various researchers in identifying and detecting the information about a vehicle. Anuja p. Nagare [1] observed that fan beam feature extraction method has more features for training the neural network thus its simulation accuracy is higher. Amit Kukreja [2] stated that number plates are of different size and shape and proposed a system by segmenting and localizing the number plate to identify each number separately. Anand sumatilal Jain [3] presented a detailed explanation of the system by categorizing it and morphological operations is used for extracting the LP from the image. Aniruddh Puranic [4]

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presented a novel approach using template matching algorithm for detecting and recognition of vehicle number plate and proved the obtained results to be accurate. Baoming Shan [5] reported that local adaptive binarization and text-line construction are operated to localize the license plate and tested results shows the method can recognize Chinese character, capital letter and number correctly. ChJaya Lakshmi [6] presented an efficient method by using Sobel edge detection performed on multifaceted image and detects edges and fills the holes less than 8 pixels for vehicle plate detection. Dening Jiang [7] reported that system uses plate localization, character segmentation and recognition get the desired information and also presented that the algorithms were developed using a set of training images.

Jatinder Singh [8] concluded that morphological scanning technique is efficient technique to scan the whole image, extract number plate portion and stated that split and merge segmentation is used to segment whole detected number plate using the neural networks. Rasheed.S [9] presented two modules namely license plate localization module using Canny detector and Hough lines and license number recognition module using template matching for detection and recognition of Islamabad vehicle number plate. Shokri Gendy [10] reported a strong technique for localisation, segmentation and recognition of the characters within the located plate and Hough lines are determined using Hough transform to avoid unwanted illumination. Sourav Roy [11] stated that number plate is various size and shape and also have different colours in different countries and used histogram equalization to enhance the binarized image. Tahir [12] stated that the system uses series of image processing techniques for identifying the vehicle and OCR methods is used for recognition to minimize the misalignment from different size and angles. Vedika Kamble [13] stated that vehicles can be accurately detected using traffic management system and number is extracted using different methods and algorithms. Yilmaz. K [14] presented a reliable hybrid system using novel algorithms and Learning Vector Quantization (LVQ) is used for template matching to eliminate noise and extract characters.

These results show that based on number plate, the unique identification of a vehicle and the owners can be done to identify the stolen vehicles. Hence, a methodology is proposed in this paper.

III. METHODOLOGY

In this paper, a methodology is proposed to check the owner details of a vehicle. When the number plate is being scanned the intended user receives an OTP and once when the OTP is verified, the details regarding the particular vehicle is displayed. This is implemented through ML kit algorithm to access easily through mobile phones.

When the system scans the number plate it provides a complete overview of vehicle details such as owner information. To enhance the security feature, a One Time Password (OTP) constraint is added. It ensures that user's data are being protected against data violations. The major prerequisite for the system is that every user must have a valid number plate. And the number plate must be scanned in all possible angles with clarity. These images will be captured and stored in a centralized repository.

If the clarity of the image is low, then it may lead to poor resolution. Hence, it may create noisy or blurred images. Therefore, to overcome this limitation ML kit (Machine Learning) algorithm is used in this system. This ML kit algorithm helps to detect the image efficiently by processing the image of the number plate.

Steps for implementation

Step 1: Scan the Number Plate

- i) Scan the image of the number plate of the vehicle in different angles and store in a repository
- ii) Store the following information about the vehicle:
 - Vehicle Number
 - Vehicle Name
 - Vehicle Model & Colour
 - Registration details
- iii) Store the following information about the owner:
 - Owner Name
 - Aadhar Number / Identification details
 - Permanent Address
 - Mobile Number
 - Occupation details

Step 2: Process the captured images

- i) Capture the image of the number plate of any vehicle on the road
- ii) Perform character segmentation to identify each character in the plate
- iii) Perform syntactic analysis of the captured image

Step 3: Authenticate the owner information

- i) Generate OTP after capturing an image and process.
- ii) Extract the vehicle information and owner information from the repository for the matching OTP.
- iii) Generate alarm if no matching records are found in the repository

IV. RESULTS AND DISCUSSIONS

This system is implemented to track the authenticated user of a vehicle on road. In many cases, suspected persons are identified by traffic police and the vehicle records are verified. The vehicles are identified as stolen vehicles when proper relevant documents are not available with the person having a vehicle. To make this identification easier, identifying the owner of the vehicle through number plate scanning process has been implemented in this system. Based on the algorithm section in section III of this paper, the images of the number plates of the vehicles are scanned and stored. Whenever the number plate is captured as an image, it generates an OTP to the owner of the vehicle. Only when the OTP process is successful, the vehicle and the owner informer will be displayed in the mobile in which the image was captured.

Thus, in cases of fraud and theft, if the OTP is not generated in the driver's mobile or if the vehicle information and owner information generation fails, then it can be identified as a fraudulent case and the vehicle is a stolen vehicle.

Fig 1 shows the image of a vehicle captured by the owner. Fig 2 shows the image captured by traffic police when the driver is suspected. Fig 3, Fig4 and Fig 5 shows the information generated by the system after the system process the images. If the owner dashboard is not generated or if it mismatches with the information of the current user of a vehicle, then it shows it is a stolen vehicle.

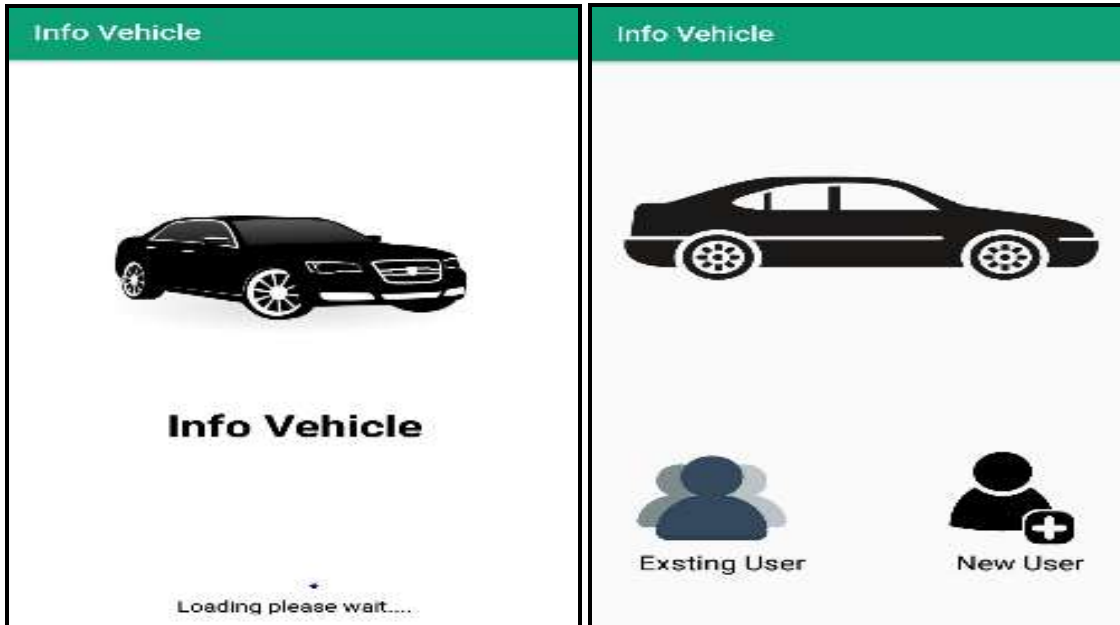


Fig. 1: Original Image Fig. 2: Captured Image

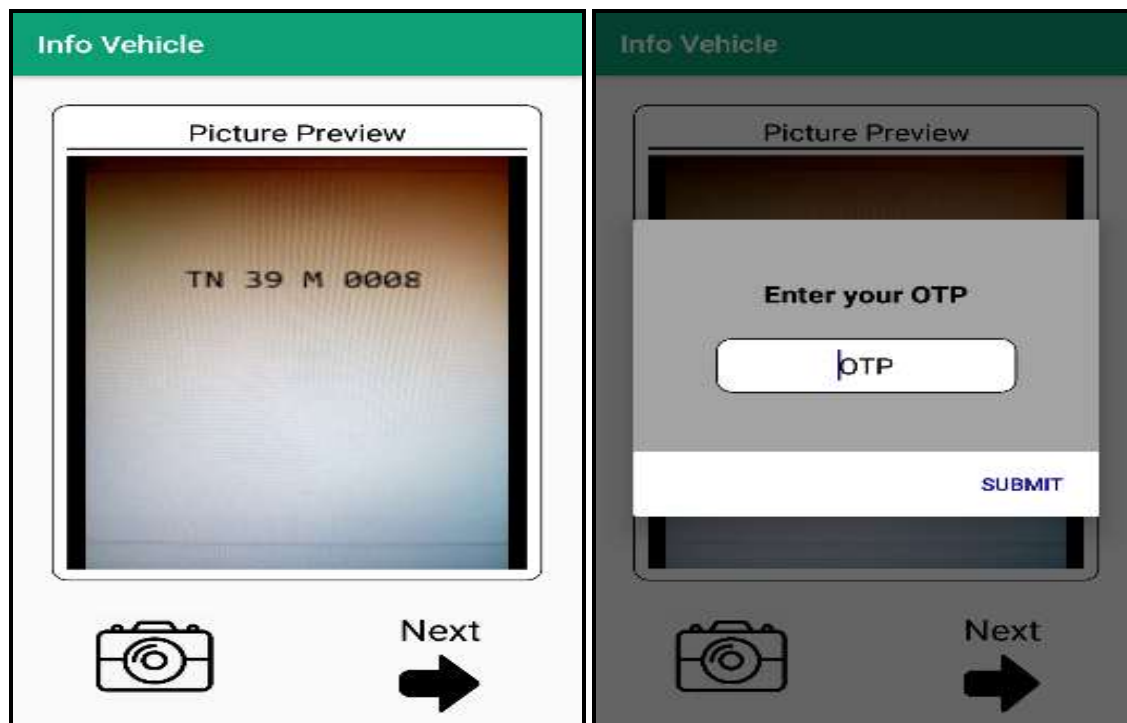


Fig. 3: Preview of Captured Image Fig. 4: OTP constraint Feature to Enhance the Security

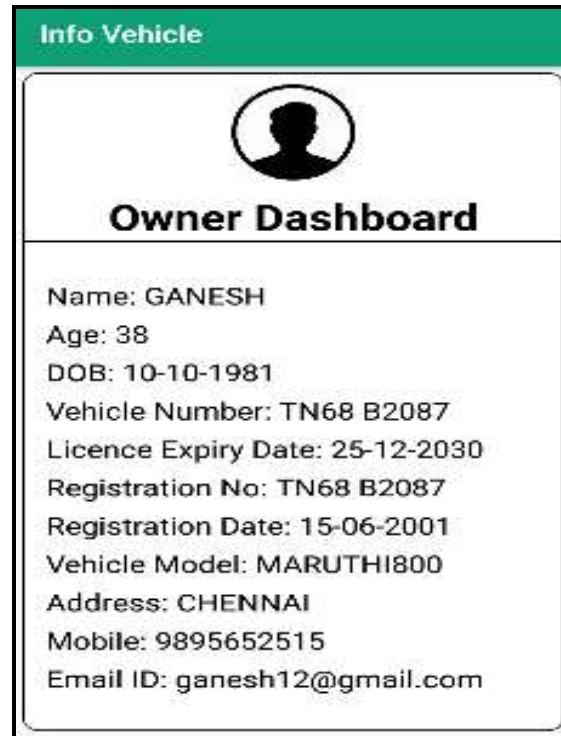


Fig. 5: Displays Output Corresponding to the Captured Number Plate

V. CONCLUSION

An efficient system to detect the stolen vehicle has been proposed in this system. It can be easily deployed in any android systems and hence it is a user-friendly application. A single click of capturing the image of the number plate of a vehicle, the complete information about a vehicle and its owner can be obtained. It can be used effectively in toll gates for automating billing systems also.

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