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Automatic Detection of Suspected Vehicles

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Abstract : *Globalization and advancement in technology have almost become twins in the 21st century. Crime and Theft have also increased multiple folds. Technology to combat and investigate such cases are rapidly changing incorporating new age tools. One such tool is Image Processing, currents widely researched upon these days.*

The crime problems become critical issues for national security. Under such cases of crime, theft, hit and run and kidnap, the traditional process of comparing those license plates utilizing the matching of alphabet character is not effective and is time consuming. To overcome this shortcoming, we have developed a system which emerges as an effective method to tackle the problems. Our project proposes the use of image processing techniques to extract the number plate from the processed input image and the use of optical character recognition algorithm to recognize the vehicle number. The recognized vehicle number is compared with the blacklisted vehicle numbers in the control database. Upon finding a suitable match the authorities are alerted by a text message. The process of identifying the culprit is safe as data pilferage can be controlled and faster as compared to the existing system.

Key Words: **Image Processing, ANPR (Automatic Number Plate Recognition), Gray-Scale Conversion, Contours, Optical Character Recognition (OCR).**

1. INTRODUCTION

The Automatic Number Plate Recognition (ANPR) was invented in 1976 at the Police Scientific Development Branch in the UK. However, it gained much interest during the last decade along with the improvement of digital camera and the increase in computational capacity [1]. Due to the mass integration of information technology in all aspects of modern life, there is a demand for information systems for data processing in respect of vehicles. These systems require data to be archived or by a human or by a special team which can recognize vehicles by their license plates in real-time environment and reflect the facts of reality in the information system. Therefore, several techniques have been developed for recognizing license plates software used today in many applications [2]. In most cases, vehicles are identified by their license plate numbers, which are easily readable by humans but not 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 [3]. These functions are implemented or mathematical patterns in what is called "ANPR Systems" (Automatic Numbers Plate Recognition) and mean a transformation between the real environment is perceived and information systems need to store and manage all that information [1]. In our project we have relied on software which enables the server to identify the image then, decode it into readable text -comparing it with the vehicles details available in the database and also to send an alert message to the control room, upon finding a suitable match. Elements which must be considered maximum recognition accuracy, achieve faster processing speed, handling as many types of plates, manage the broadest range of image qualities and achieve maximum distortion tolerance of input data.

2. METHODOLOGY

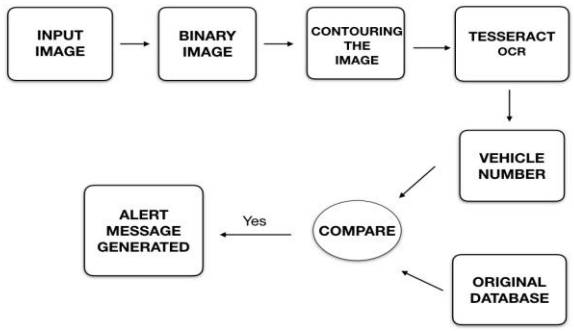

Fig-1: Block Diagram

2.1 Input Image

The system takes an image as an input. The image quality should not be more than 50% noise effect. The image size is expected to be more than 250x250 pixels.

2.2 Grayscale conversion

In this stage, the input image is converted to binary image (grayscale image). By doing this, contouring the image is achieved.

2.3 Contouring the Image

Contouring is a process of obtaining a curve joining the continuous points with same intensity under given conditions. By using this technique, the number plate of the vehicle is detected.

2.4 Optical Character Recognition

Tesseract OCR(Optical Character Recognition) has been used to extract text from the number plate.

2.5 Output

The obtained vehicle number is then compared with the vehicle numbers present in the database. If the vehicle number is present in the suspected vehicles database, then an alert message containing the location of the vehicle is sent to the police control room.

4. RESULTS

The proposed algorithm is performed in Python 3.7. The output is presented in the following figures.

Fig-2: Input Image

Source: Adapted from [7]

Fig-3: Grayscale Image

Fig-4: Contoured Image

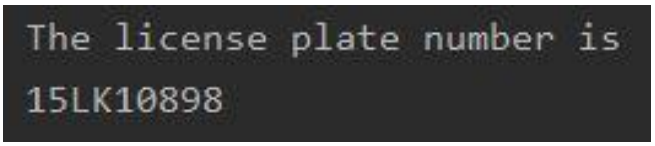

Fig-5: Tesseract Output

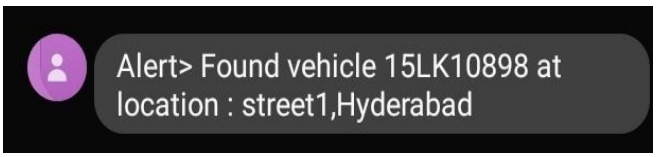

Fig-6: Alert Message

5. CONCLUSION

In this paper, the automatic license plate recognition system and text extraction using Optical Character Recognition using vehicle license plate is introduced. The system works for wide range of conditions and many numbers of number plates. The system is executed in Python 3.7 and performance is also tried on genuine images.

6. FUTURESCOPE

The following modules can be considered for future enhancement of the current project

- **Hardware connectivity:** The current project is accepting the input image from the existing image files. So, there is a need to connect hardware mechanism (camera) for capturing the image instantly.
- **Speed:** The current software is not concentrating on the speed of the vehicle. Hence hardware application can be connected for calculating the speed, which can be considered as the future enhancement.

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