ISSN (Online): 2456-0448
International Journal of Innovative Research in Management, Engineering, and Technology
Vol. 8, Issue 3, March 2023

# LICENSE PLATE DETECTION AND CRIMINAL RECORD FINDER USING AI

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***Abstract:*** ***This work proposes a method for the detection and identification of vehicle number plate that will help in the detection of number plates of authorized and unauthorized vehicles. This paper presents an approach based on simple but efficient morphological operation and Sobel edge detection method. This approach is simplified to segmented all the letters and numbers used in the number plate by using bounding box method. After segmentation of numbers and characters present on number plate, template matching approach is used to recognition of numbers and characters. The concentrate is given to locate the number plate region properly to segment all the number and letters to identify each number separately using CNN.***

***Keywords: Automatic number plate recognition, Sobel edge detection method, Criminal Record , Bounding box method***

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## 1. INTRODUCTION

Basically video surveillance system is used for security purpose as well as monitoring systems. But Detection of moving object is a challenging part of video surveillance. Video surveillance system is used for Home security, Military applications, Banking ATM security, Traffic monitoring etc. Now a day's due to decreasing costs of high quality video surveillance systems, human activity detection and tracking has become increasingly in practical. Accordingly, automated systems have been designed for numerous detection tasks, but the task of

detecting illegally parked vehicles has been left largely to the human operators of surveillance systems. The detection of Indian vehicles by their number plates is the most interesting and challenging research topic from past few years. It is observed that the number plates of vehicles are in different shape and size and also have different color in various countries.
Among the technologies related to autonomous driving, we are especially developing technologies for vehicle detection and license plate detection. In addition to vehicle detection, the significance of plate

detection will be described. As a second step after vehicle detection, for example, plates, lights, etc. of the vehicle elements are individually detected. The verification of the element by this detection makes it possible to verify whether the event that detected the vehicle was correct. This can increase the reliability of vehicle detection.

## 2. LITERATURE SURVEY

## 3.

we describe a high-performance method using deep learning. Zang et al use a CNN for three datasets of RGB color channels, and integrates the results by majority decision [10]. They show the advantage of three channel integration. Montazzolli et al. detect Brazilian plates using YOLO in real-time [11]. There are three stages, cropping small region around plate, detecting plate region, and character recognition on the plate by adjusting parameters of YOLO.
Dong et al. also present two-stage detection of Chinese plates [12]. At the first stage, it detects plate region using Region Proposal Network in low resolution, then replaces by a high resolution image, and detects four vertices of the plate using Faster R-CNN, then obtains corrected plate region using affine transform. At the second stage, seven STN and CNN units work in parallel for seven characters for separation and recognition.
The highest performance using Deep learning for standard dataset of Caltech is presented by Kim et al. [13], together with the search from the second to the seventh results. They use the faster R-CNN for the vehicle region detection and candidates for license plates in each detected region with the hierarchical sampling method (CNN) are generated. Finally, non-plate candidates are filtered out by training a deep convolutional neural network. Training two different CNN's for plates and non-plates, they remove FP results using non-plate CNN. For Caltech standard dataset, precision of 98.39% and recall of 96.83% are performed, which are the best world records at the time of publication 2017. But the method by our group, which was announced in 2018, surpasses the method of Kim et al.

Achieved performance.
By improving accuracy of character recognition, a method to detect character region at the first stage without vehicle region detection has become effective. Among them,is an ambitious paper using deep learning of character recognition. At the first stage, from candidate region detected by weak character detection making saliency map, rectangle plate region is detected after removing FP by two-class CNN. At the second stage, using character separation and character recognition, together with labeling results based on connectivity, numbers and characters on the plate are confirmed. In total 37 class CNN is constructed with ten numbers and 26 uppercase letters and a single non character. Region detection at the first stage should be improved, while character recognition at the second stage improves by adding connectivity process. Using ten numbers and 26 uppercase letters for CNN, the recognition rate can be advanced, though more kinds of characters are needed depending on each country specification. For the first stage of region detection of a plate, character recognition may fail to produce FP's for logos and advertisements other than plates. In the case of serial construction, total performance is a product of each performance of each stage. Accuracy of each stage must be the highest. Even in the case of so-called Coarse-to-Fine serial construction, the first

stage of Coarse should not be coarse but fine in accuracy, excluding FP and removing FN.
ANPR software vendors have published Accuracy results based on image benchmarks. In 2017, Sighthound announced an accuracy of 93.6% for original images. In 2017, OpenALPR's commercial software announced 95-98% accuracy rates in public images. The Brazilian team announced a scheme with an average recognition rate of 93.53% in April 2018, showing a significant improvement from the 81.8% obtained in the previous paper.
In the paper by Silva et al. at the 2018 ECCV, an example of detection in a moving picture is shown, but in the comparison of Accuracy, the result changes depending on the data set used [18]. As quoted in Table 2-1, the data averages 81-89% with the lowest at 57-75% and the highest at 96-98%.

## 4. METHODOLOGIES

**5.**

The issue of practical use of automatic driving is discussed in ROAD2016. With the advancement of technology, the number of test cases is said to be huge and to be 1012. Because of this, Virtual Test becomes more important. With the addition of AI technology, this type of test case is expected to become even more extensive, and it is also pointed out that the deterministic test becomes more difficult. With the technology that processes images obtained from camera sensors and recognizes them in the external world, many methods can be developed and studied by software development on a computer. Our group has been promoting the Samurai Project on ADAS since 2016, and has developed image processing technologies such as license plate detection, lane detection, vehicle detection, vehicle maker logo detection, front grill detection, etc. .

Among them, LPD by deep learning has developed an improved method that surpasses the highest performance of the past. Currently, many LPDs detect plate areas by number and character recognition.
The recognition and extraction of text is a crucial aspect of the number plate detection process. This research work focuses on the automation of text detection and extraction. In this method, the photos of vehicles are captured. Then the part of number plate is identified, the plate information (number) is extracted and sent to the concerned authority. The concept is based on optical character recognition (OCR). A bilateral filter is used for edge detection and a canny algorithm is applied for edge detection. This method has the advantage of removing the requirement for manual writing and numerical analysis by authorities. This involves the computation that requires far fewer equipment assets to work, allowing it to be deployed on low-end hardware and simple to set up in the real world. This project is employing a strategy for text recognition from picturesutilizing Python, Open CV, OCR.

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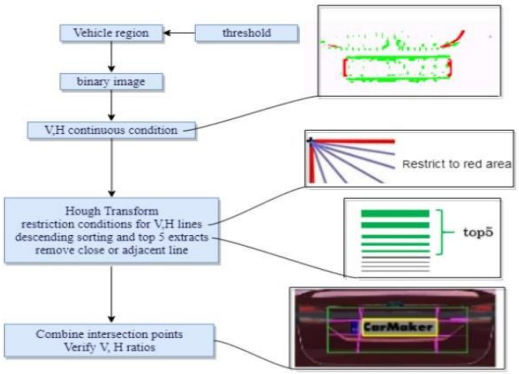
## 4. WORKFLOW




## 6. SYSTEMARCHITECTURE

Text recognition and extraction is an important part of the license plate recognition process. This research focuses on text recognition and extraction automation. This method takes pictures of vehicles. Then the part of the license plate is identified, the number information (number) is extracted and sent to the relevant authority. The concept is based on an optical character recognition (OCR) system. A bilateral filter is used for edge detection and a matching algorithm is used for edge detection. The advantage of this method is that it does not require manual typing of authorities and numerical analysis. It requires computations that require much less hardware resources to run, allowing it to run on cheaper devices and easy to implement in the real world. This project uses a strategy to recognize text from images using Python, Open CV, OCR.

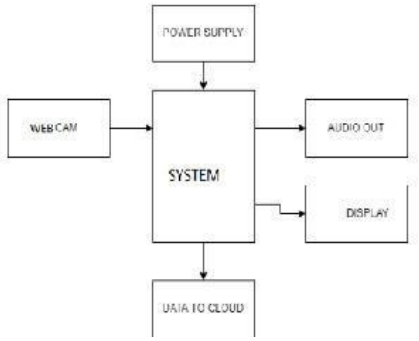



FIG- The architecture of license plate detection

## 6. RESULT

The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The

system is implemented on the entrance for security control of a highly restricted area like military zones or area around top government offices e.g. Parliament, Supreme Court etc. The developed system first detects the vehicle and then captures the vehicle image. Vehicle number plate region is extracted using the image segmentation in an image.

## 7. CONCLUSION

License plate detection and criminal record finding using AI have great potential in enhancing law enforcement efforts. With the help of AI technology, it is possible to identify license plates from vast amounts of surveillance footage, allowing law enforcement to track the movement of vehicles and potentially identify suspects involved in criminal activities. Additionally, the use of AI in criminal record finding can expedite the process of identifying potential suspects and streamlining investigations.
However, it is important to consider potential ethical concerns related to the use of AI in law enforcement. For example, there are concerns around data privacy and the potential for misuse of AI technology. It is crucial to develop clear policies and regulations to ensure the responsible and ethical use of AI in law enforcement.

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