



Term Paper on Number Plate Detection System

Submitted by-

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Number Plate Detection System

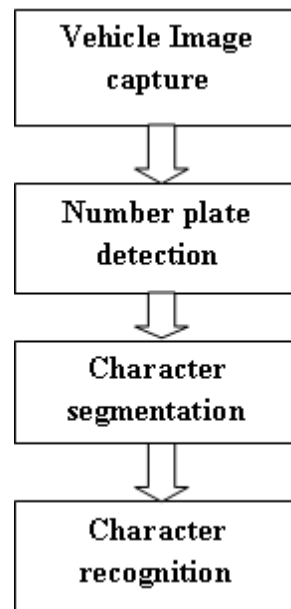
Abstract:

Traffic control and vehicle identification has become major task in every country that needs to be resolved. Sometimes it becomes difficult to identify the person who violates the rules of the road, which might cause accident. Therefore, it becomes difficult to catch and punish those people because the authorities of traffic might not be able to retrieve vehicle number from the moving vehicle because of the speed of the vehicle. Therefore, there is a need to develop Automatic Number Plate Recognition system as a one of the solutions to this problem. There are numerous Number Plate Recognition systems available today. These systems are based on different methodologies but still it is really a problem to identify the vehicles as some of the factors like high speed of vehicle, non-uniform vehicle number plate, language of vehicle number and different lighting conditions can affect a lot in the overall recognition rate. Most of the systems work under these limitations. In this paper, different approaches of ANPR are discussed by considering image size, success rate and processing time as parameters.

Introduction:

In last few years, license plate recognition has came out to be one of the most useful methods for vehicle surveillance. It is can be applied at number of public places for fulfilling some of the purposes like traffic safety, automatic toll text collection, car parking system and Automatic vehicle

parking system. Number plate recognition algorithms are generally divided in four steps: (1) Vehicle image capture (2) Number plate detection (3) Character segmentation and (4) Character recognition.



As it is shown in Fig, the first step i.e. though it seems very simple to capture image of the license of a moving car in such a manner that none of the component of vehicle especially the vehicle number plate should be missed. Current systems take maximum 50ms to capture the image of the moving vehicle. The success of fourth step depends on how second and third step are able to locate vehicle number plate and separate each character. These systems follow different approaches to locate vehicle number plate from vehicle and then to extract vehicle number from that image.

Most of the recognition systems are based on common approaches like artificial neural network, Probabilistic neural network, Optical Character Recognition, Feature salient, Configurable method, inductive learning, color segmentation, scale invariant feature transform, trichromatic imaging. A case study of license plate reader is well explained in. Some authors focus on improving resolution of the low-resolution image by using technique called super resolution. Sometimes it becomes necessary to assess the quality of recognition systems system.

2. NUMBER PLATE DETECTION

Most of the number plate detection algorithms fall in more than one category based on different techniques. To detect vehicle number plate following factors should be considered:

- (1). Plate size: a plate can be of different size in a vehicle image.
- (2). Plate location: a plate can be located anywhere in the vehicle.
- (3). Plate background: A plate can have different background colors based on vehicle type. For example a government vehicle number plate might have different background than other public vehicles.
- (4). Screw: A plate may have screw and that could be considered as a character.

A number plate can be extracted by using image segmentation method. There are numerous image segmentation methods available in various literatures. In most of the methods image binarization is used. Some authors use Otsu's method for image binarization to convert color image to gray scale image. Some plate segmentation algorithms are based on color segmentation. A study of license plate location based on

color segmentation is discussed. In the following sections common number plate extraction methods are explained, which is followed by detailed discussion of image segmentation techniques adopted in various literature of ANPR or LPR.

2.1 Image binarization

Image binarization is a process to convert an image to black and white. In this method, certain threshold is chosen to classify certain pixels as black and certain pixels as white. But the main problem is how to choose correct threshold value for particular image. Sometimes it becomes very difficult or impossible to select optimal threshold value. Adaptive Thresholding can be used to overcome this problem. A threshold can be selected by user manually or it can be selected by an algorithm automatically which is known as automatic thresholding.

Discussion

In most of the literatures, the number plate segmentation algorithms work in restricted conditions like illumination, number plate shape (generally rectangle), size, distance from camera and vehicle and color. It is to be noted that only few algorithms work for real-time video image of a number plate otherwise static image of number plate is remitted to ANPR for further processing. In Table 1, different plate segmentation detection success rate against plate resolution of different ANPR is depicted. The systems in which image size and success rate of number plate detections are not mentioned, are not included in Table 1. It is observed that plate segmentation

processing time is ranged from 15ms to 1360ms. The lower processing time of 15ms was reported in [52] while higher processing time of 1360 was reported in [53]. It is evident that number plate detection rate affects character segmentation and character recognition which in turn affects overall recognition rate.

Conclusion

Number Plate Recognition System can be further modified for the identification of the owner of the vehicle, identification of the model of the vehicle, traffic control, vehicle speed control and tracking the location. It can be further modified to identify the languages on the number plate automatically based on the training data. It can provide various benefits like traffic safety enforcement, security- in case of suspicious activity by vehicle, easy to use, immediate information availability- as compare to searching vehicle owner registration details manually and cost effective for any country. For low resolution images some improvement algorithms like super resolution of images should be focused. Most of the Number Plate Recognition System focus on processing one vehicle number plate but in real-time there can be more than one vehicle number plates while the images are being captured.