

License Plate Recognition and Reading Robot Using Image Processing

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Abstract - This paper focuses on reading and recognition of Number Plate of the vehicles violating the parking rules using image processing. The movement is achieved by a robot that move about the allotted place to check for parking violation. Here the robot will be checking for white line violation which would be achieved by an ultrasonic sensor. The License Plate Number extracted could be sent to the respective authority for further actions to be taken. Our main focus in this paper lies on the identification and detecting the number from the image captured by the camera mounted on the robot.

Key Words: *Image processing, parking violations, Number plate reading, Robot, Camera.*

1. Introduction

Vehicle identification by means of automatic license plate recognition is widely used to prevent and register parking code violations. Such systems can be installed on fixed mounts and on patrol cars. In some cases, the in-patrol license plate recognition process can be automated by installing an Automatic License Plate Recognition (ALPR) module on a mobile robot. This solution allows an entity to significantly reduce operational cost and expand the application of its license plate recognition system.

The device makes use of image processing and its application to detect the violating parked vehicles and helps read the number plate as well. Image processing is used in many computer vision applications. Vehicle license plate recognition is an image processing technology used to identify vehicles by their license plates. This technology can be used in various security and traffic applications, such as finding stolen cars, controlling access to parking lots and gathering traffic

flow statistics. The purpose of this paper is to develop a Parking Enforcement Robot and take an action respectively.

The system, based on raspberry pi and camera, catches photo frames which include a visible car license plate and processes them. It notices that the most researches nowadays, especially image processing researches, tend to use in security field, because the digital images become the main dependent component in most electronic devices used in this field. Systems can store a group of images in a computer database and then using image processing programs it can recognize the captured pictures from monitoring camera and thus can make the right decision depending on matching the recognized image with the stored database. Due to increasing need for protecting the materials and the articles in the houses, directorates, etc., this paper used a digital images.

2. Working

The system designed would be required to move in an allocated parking space to check for white line violation and the detection and reading of the number plate of the violated vehicle.

The detection of the vehicle violating the parking rule is done using a sensor mounted on the foot of the robot. The sensor checks for the change in the distance of the vehicle from it and determines that the vehicle which gives the changed value (which is lesser than the minimum value set for the particular space) is violating the rule. Only when the above condition is satisfied the sensor will trigger the camera to capture the image of the

vehicle . This image is processed to extract the number plate and the vehicle owner is identified.

Once the image is captured the controller processes the image to extract the number plate based on the following algorithm:

Figure 2.1 : Original Image



The original image(Fig 2.1) of the vehicle violating the parking rule is first pre processed and converted to a Grayscale image.Grayscale is a range of monochromatic shades from black to white. Therefore, a grayscale image contains only shades of gray and no color as shown below.

Figure 2.2 : Grayscale Image



Many image editing programs allow you to convert a color image to black and white, or grayscale(Fig 2.2). This process removes all color information, leaving only the luminance of each pixel. Since digital images are displayed using a combination of red, green, and blue (RGB) colors, each pixel has three separate luminance values. Therefore, these three values must be combined into a single value when removing color from an image.

The next step is to threshold the image(Fig 2.3). Thresholding is simple, yet effective, way of partitioning an image into a foreground and background. This image analysis technique is a type of image segmentation that isolates objects by converting grayscale images into binary images.

Figure 2.3: Threshold



Next, all the possible characteristics in the image are detected and all contours are highlighted as shown below(Fig 2.4). After this the possible characters are visible (shown in Fig 2.5)

Figure 2.4 : All contours



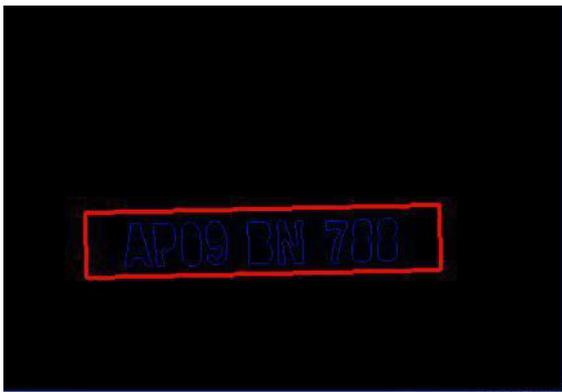
Figure 2.5 : Finding possible characters in the image



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Only the characters in the image that is taken are separated from all the other noises in the image. The characters are identified using ocr technique and recognised comparing it to the alphanumeric database in the ocr. Possible plates are identified from the image that contains the matching characters as shown below (Fig 2.6).

Fig 2.6: Possible Characters



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The cluster with the most number of characters is assumed to be the number plate and processed further in order to extract the characters in the plate.

The steps for extracting the characters from the cluster is shown below from fig 2.7 to fig 2.12.

Fig 2.7: Extracted Plate



Fig 2.8: Grey Scale Image



Fig 2.9: Threshold Scale Image



Fig 2.10: Possible Characters



Fig 2.12: Recognising characters in plate



3. Conclusions

The final output of the number plate is hence extracted successfully using image processing. The characters in the red box below show the number plate that is obtained after processing the original picture of the vehicle that has violated the parking rule.

Figure 3.1 Final Result



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