

Analysis of Various Number Plate Detection Techniques

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Abstract: In modern world people are surrounded by numerous problems in their regime. One of them is traffic congestion on the roads, which is gaining momentum day by day. Researches are going on in various fields of science and technology to overcome this evil. In the field of Digital Image Processing an automatic number plate of moving vehicle recognition (ANPR) algorithm is designed which is becoming a crucial factor in traffic congestion. It will help in various facets like minimizing the different sort of road violations, advance vehicle tracking and identification of unauthorized and stolen vehicles, no time consumption at toll lanes using automated tax payment using this algorithm. In this paper the main perspectives are to disclose the steps involved in the recognition process and second to review all previously designed methods and algorithms and providing researchers an aid in finding the best algorithm for further enhancements.

Keywords: Image edge detection, Character recognition, Character Segmentation, Image segmentation, Image Processing

INTRODUCTION

Image processing is a novel method for detect the image which is in the form of zero's or ones and after applying some methods we get the desired image as a result. The acquirement of images is said to be imaging in which multiple images are taken as an input and after that we can process the image and resulted output is observed. The image processing fields are like we can observe that graphics are used to create the images after that treatment of that images are said to be processing and finally improvement of images are said to be improved or enhanced image. The discipline of image processing is that in which input and output both are images and methods for process the image may vary. Image processing has different applications:

- Agriculture: It is used to perform adaptive sampling of 3D coastal ocean environment by Network's sensors and vehicles.
- Medical: UWNs can execute biological, chemical and nuclear pollution monitoring.
- Communication: UWSNs can assist detecting underwater oilfields or reservoirs which determine routes for laying undersea cables, and helped in exploration for important minerals.
- Commercial: Sensor networks can measure seismic action through remote locations which can give tsunami warnings to coastal areas and also examine the special effects of submarine earthquakes.
- Character Recognition: Sensors can be used to locate dangerous rocks or shoals in shallow waters which gives mooring positions, submerged wrecks.
- Visualization: Multiple AUVs with acoustic and optical sensors can be used to carry out quick environmental evaluation and detect mine-like objects for simultaneous operations.

Number Plate Detection: The term Number Plate Detection is a emerging technique of image processing. The number plate detection is very vast in the field of computer science. The increase of vehicles on roads is very difficult to handle by traffic rules. The main important thing is how to visualize and identify the vehicle? With the use of Advanced Number Plate Recognition (ANPR) we can easily solve the issue of that problem. Now days, the traffic system should be smart. Because they are places the camera on each traffic light for identifying the vehicles but sometimes these cameras are fail to detect the image of vehicle's number due to the image quality. Quality in terms of picture is blurred because the distance between the camera and the vehicle is more as per the camera norms or settings of camera.

So the license plate recognition is very helpful for those problems. They are recognizes the vehicles by their vehicle plate.

STEPS FOR NUMBER PLATE DETECTION

1. **Input Image:** The input image is first step of find out the correct number plate of any vehicle. The image can be gray scale and it was clicked from a good high definition camera. Because picture quality matters for start the work as we take this picture is as our input image. The image is also in the form of pixels not any other image is used for the detection and recognition.
2. **Preprocessing:** Preprocessing is a term in which the image is converted into analog to digital form. The image is captured from the camera and used for the detection of number plate of any vehicle. If the image is in the form of video then video is divided onto the frames and these frames are used for identifying the correct number plate. Preprocessing of image is used for conversion of RGB scale image to gray scale image.

Preprocessing techniques are:

Gray Scale Conversion: The gray scale conversion is that the RGB i.e 24 bit color value of R, G, B that are separated by each other and convert it into 8 bit gray value.

Filtering: Filtering is a process which is used for noise and blur removal from the acquired image. The median filter can be applied for noise removal from gray scale image and helps to sharpening and smoothening of image. The Gaussian filter is also helpful for the noise removal process and enhances the quality of image with process and the large size.

3. License Plate Extraction: License plate extraction is very important step of number plate detection. When the median filter is done on the gray scale image then we have a resulted image which is free from noise and unwanted pixels that are not useful for further processing. The license plate extraction techniques are:

- a) **Binarization:** The image binarization is a procedure with applying the threshold on the image to convert the image into black and white. The particular threshold value selection is very tough but adaptive threshold overcomes that problem. The threshold value can identify the black and white pixels of the image.
- b) **Edge Detection:** the edge detection is for extracting the features of the image. Edge detection is a key feature to find out the connected curve boundary of the image.

4. License Plate Segmentation: When the region growing is fixed that we have to set particular region for the desired output. After we are searching for the pixels that are required for the region criteria. When the pixels are found as per the requirement then check the neighboring pixels, if the neighbors are equal to desired pixel then they are also mentioned in that region.

So we can say that the number plate detection is a segmentation of characters which are divided onto regions and their pixels values are checked and undesired pixels are removed from the image.

RELATED WORK

There are various types of work are done on number plate detection with new creations and some issues are also there in previous research.

- Rahim Panahi et.al [2019] proposed a system which is highly accurate for Automatic Number Plate Recognition (ANPR). This type of systems is used by Intelligent Transportation Systems due to increase of number of vehicles on roads and identification of particular vehicle is not as easy as earlier. When the weather is not cleared it will be work for that type of weather conditions. They also designed for the lighting conditions, different traffic situations and also deal with unclear vehicle number plate.
- K. Tejas et.al [2019] developed a automatic license plate recognition system with the use of morphological operations causes deformity in the characters during segmentation. They propose a novel algorithm to tackle the issues through a unique edge detection algorithm.
- Siddharth Sircar et.al [2018] proposed the vehicle number plate detection system that is capable of detecting a number plate and extracting the characters from the number plate. The approach is to build a predictive system to predict the position of number plate in an image, and hence, extract the characters from the number plate. The aim here is to predict the position of number plate efficiently in an image and extract characters form the number plate in minimum time.
- Reshu Kumari et.al [2017] In this paper they introduced the techniques and some applications of the ANPR that is detection of stolen vehicles, monitoring, payments on tolls and parking of vehicles. The number of tasks can be accomplished by the ANPR which is been employed by each government.
- Dinesh Bhardwaj et.al [2015] described the various applications and characteristics of vehicle number plate detection system. They asked about the detection part of the ANPR which is separated in three parts: Number plate detection, segmentation and character recognition. In this paper existing techniques are also described for the future work of ANPR.
- Sushama H.Bailmare et.al [2015] has proposed a System for the different shape and size of the number plate which is to be detected by the system. They are mainly focus of the number plates of the West Bengal(India) which is in white and yellow color. They used the methods of sobel edge detection and morphological operation for segmentation of each character separately.
- Siddharth U. Mishra et.al [2014] has proposed a System, which is used for extracting the license plate from a vehicle and use for various applications. They proposed the technique for criminal surveillance. In this system, the six digit number plate is detected and used for the localization of the number plate. This system helps to leads the efficiency of the previous system. The operations on the license plate are performed with the morphological methods.

Author	Year	Techniques Used	Outcomes
Rahim Panahi	2019	The ANPR uses RANSAC And Support vector machine.	The system achieves the 97% accuracy on the different datasets on dirty number plates and unclear weather conditions.
K. Tejas	2019	The morphological operation and edge detection methods are used by vehicle number plate detection.	The data being updated automatic by Internet of things(IoT) on the databases and edge detection algorithms tackles the various issues which are accomplished at detection of the vehicle.
Siddharth Sircar	2018	The dilation, sharpening, segmentation and extraction algorithms are established in that paper.	The system achieves the 95% accuracy from the various distances and also extracts the characters which are clearly identified by the system.
Reshu Kumari	2017	The template matching and feature extraction algorithms are used.	The Different techniques and applications are described for the future work.
Dinesh Bhardwaj	2015	Vehicle speed control and vehicle tracking algorithms are used.	The vehicle searching operation, registration of vehicle should be online with that sytem.
Sushama H.Bailmare	2015	The morphological operation and sobel edge detection methods are used.	The time required for detection and recognition being reduced by using that methods.
Siddharth U. Mishra	2014	The sobel edge detection and automatic number plate detection is proposed by that paper	The effort used for recognizing vehicle number plate detection is reduced.

CONCLUSION

This paper presented a descriptive survey on pre-existing automatic number plate recognition techniques and algorithms. Moreover the complete process, how these algorithms work is also well explained through each category and phases. This paper shed light on preprocessing, extraction, character detection and segmentation. Researchers from the future may use this knowledge for their reference and proceed in their ongoing researches.

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