ISSN: 2277-9655
Impact Factor: 3.785

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

A REVIEW PAPER ON RECOGNIZE AUTOMATIC NUMBER PLATE AND BLURRED NUMBER PLATES

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DOI: 10.5281/zenodo.51910

ABSTRACT

This review paper provides a brief survey on various recognition techniques for automatic number plate recognition (ANPR) in image processing. ANPR is real –time embedded system which uses number plate to identify the vehicle. This expertise is in advance popularity in security and traffic installations. License plate recognition system is an application of computer vision. Computer vision is a method of using a computer to take out high level information from a digital image. The useless homogeny among different license plates such as its dimension and the outline of the license plate. LPR system consists of Image acquisition, License plate extraction, License plate segmentation, License plate recognition phases. Automatic number plate recognition systems are today used in various traffic and security applications, such as parking, access and border control, or tracking of stolen cars. Till now, all the LPR systems have been developed using neural networks. This work proposes to implement the system using Gabor filter, OCR and Vision Assistant to make the system faster and more efficient. There are different techniques for recognize the ANPR using object character recognition, neural network and boundary detection algorithm etc.

KEYWORDS: Automatic number plate recognition (ANPR), Image acquisition, License plate recognition (LPR), Optical character recognition (OCR), and neural network.

INTRODUCTION

An image consists of a set of points or picture elements stored as an array of numbers in a computer. Image processing is the study of any algorithm that perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image [10]. ANPR is simply the ability to extract and recognize the characters in the license plate number of the vehicle from an image automatically. Some application of an ANPR system are automated traffic surveillance and monitoring, system parking toll collection, access and control of borders, or detection of stolen cars, petrol station automation, travel time tracking [7,10]. ANPR recognize the vehicle license number from an image or images taken with a digital camera color, B/W or infra-red. It is accomplished by combining a lot of techniques such as object detection, image processing, and pattern recognition. The variations in the types of plate or environment cause challenges in identification and recognition of license plates. These standard features of system using the license plate number as the size of the plate boundary for plates, color and font of the character etc. help to easily locate the plate number. In few cases, other unwanted decorations are present on number plate.

LITERATURE REVIEW

Hanit Karwal, Akshay Girdhar In this paper [1] an exponential increase in number of vehicles necessitates the use of automated systems to maintain vehicle information is explained. The information is highly required for both management of traffic as well as reduction of crime. Number plate recognition is an effective way for automatic vehicle identification. In the proposed algorithm an efficient method for recognition for Indian vehicle number plates has been devised. The algorithm aims at addressing the problems of scaling and recognition of position of characters with a good accuracy rate of 98.07%.

S. Ramalingam et al. In this paper Work on Automatic Number Plate [2] Recognition (ANPR) part of road safety by detecting and deterring a range of illegal road. A key research problem identified is the lack of an objective and independent assessment process for benchmarking ANPR systems in the UK. With this is mind, it is proposed to generate key data sets through a simulation process that will generate car number plate images. As a first step, such plates will show variability in character spacing for assessing ANPR systems which will demonstrate the principles for benchmarking. Such a system will avoid the need for carrying out any resource intensive field trials by the Police Force which is currently the case.

Abd Kadir Mahamad et.al in this paper inspection and recognition [3] of Malaysian vehicles has been done using optical character recognition of the image processing. An intelligent OCR system has been used as a library and using Lab VIEW software, system is designed. This system is tested for various implementations to ensure that that proposed method can be applied for real implementation [10]. Experimental results show good performance for alphabet and vehicle plate recognition.

Kuldeepak et al. In this paper [4] they introduced that high degree of accuracy has been required by the number plate recognition when roads are busy and number of vehicles are passing through. To overcome this problem, there is a need of automatic number plate recognition. It also gives us warning for the stolen vehicle which cannot be possible for man handling services. Therefore to achieve better accuracy optimization is required. Also, the issues like stains, blurred regions, smudges with different font style and sizes should be kept in mind. This work can be further unlimited to minimize the errors due to them.

Muhammad TahirQadri et al. In this paper [5], the automatic vehicle identification system using vehicle license plate is presented. A series of image processing techniques of the system for identifying the vehicle from the database stored in the PC. The system is implemented in MATLAB and on real images performance has been tested. The simulation results show that the system strongly detect and recognize the vehicle against different lightening conditions using license plate and it can be implemented at highly restricted areas. However there is a still need of an improvement. With the help of high resolution camera system robustness and speed can be increase. In this project for the recognition the OCR methods is used which is susceptible to misalignment and to different sizes [9]. The affine transformation can be used to progress the OCR recognition from different size and angles.

AmrBadr et al. In this paper [6] Automatic recognition of car license plate number became indispensable part in our daily life. Because of the rapidly increase of cars and transportation systems which make it not viable to be fully managed and monitored by humans. This paper mainly explain an ANPR using Morphological operations, Histogram manipulation and Edge detection Techniques for plate localization and characters segmentation [9]. Artificial Neural Networks are used for Character classification and recognition [11].

Markus Friedrich et al. In this paper [7] they explained examples which demonstrate the potential of ANPR-systems for transport planning, traffic engineering and traffic operation.

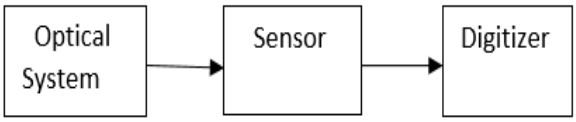
The authors have applied the systems as mobile systems for one or two day surveys. For operators of urban roads or motorways a permanent installation would significantly improve the traffic state and incident detection. This can be used to inform the drivers and to optimize traffic control systems.

TECHNIQUES OF AUTOMATIC NUMBER PLATE RECOGNITION

[A] ANPR system that extracts a license plate number from a given image can be composed of various techniques that are Image acquisition, License plate extraction, License plate segmentation, License plate recognition [4].

i. Image Acquisition: With the help of sensor image is captured and digitized it with the help of analog to digital convertor only when image is in analog form. That uses an image acquisition card that converts video signals to digital images based on some hardware-based image pre-processing [9]. It consists of three parts. These parts as follow:

ISSN: 2277-9655
Impact Factor: 3.785



Optical System: This is non-electronic part which is consists of lenses and other similar parts. Image input is given in this part. It deforms the image.

Sensor: It is another important part of the system which transform optical signal to electrical equivalent [5].
Digitizer: In this part an analog electric equivalent is transformed to the digital version within two procedures first sampling and quantization [4].

ii. License Plate Extraction: Rectangular shape is extracted by finding all the possible rectangles in the image. This is the most important stage in an LPR system [4]. This method is based on scale shape analysis, which in rotate is based on the hypothesis that, characters have line-type shapes nearby and blob-type shapes globally. In the scale shape analysis, Gaussian filters at various balances blur the given image and larger size shapes has emerge at larger scales. To notice these scales the design of principal curvature plane is introduced. By means of normalized principal curvatures, characteristic points are extracted from the scale space x-y-t. These positions (x, y) indicates the position of the outline and the degree t indicates the inbuilt characteristic dimension of corresponding figures. All these characteristic points facilitate the pulling out of the shape from the established image that has line-type shapes in the vicinity and blob-type shapes globally. Finally the record of horizontal and vertical line segments is collective and any rectangular regions harmonizing the dimensions of a license plate are kept as candidate regions. The disadvantage of, this method is that it requires huge memory and is computationally costly.

iii. License Plate Extraction: The license plate is then segmented to extract the characters for recognition. The number plate recognition algorithms use single method for character recognition [6]. The fundamental idea after region growing is to recognize one or more criteria that are quality for the desired region. After establishing the criteria, the image is searched for any pixels that fulfill the requirements. Whenever such a pixel is encountered, its neighbors are checked, and if any of the neighbors also equal the criteria, both the pixels are measured as belong to the same region.

iv. License Plate Recognition: the extracted characters from license plate are recognized and the output is license plate number. It presents the methods that were used to categorize and then recognize the individual characters. The classification is based on the extracted features. Extracted characters may have some noise or they may be broken .The extracted characters may also be tilted. These features are then classified using either the statistical, syntactic or neural approaches.

[B] PROPOSED WORK

In this work, technique will be proposed which will recognize number plate in which are distorted and image taken from far distance [13]. The second step which is going to implement is to detect shape of the vehicle and on the basis of shape vehicle are categorized [7]. To implement proposed technique following steps of followed:-

[1] The automate number plate system will be designed which will detect distorted number plates and also type of vehicles.
[2] To detect number plate car image is taken as input and that image will be converted into gray scale image
[3] The gray scale image will de-noised using gobar filter [5].
[4] The morphological segmentation will be applied to detect boundary of the number plate.
[5] The technique of split and merge segmentation will be applied with neural networks to detect number plate [3].
[6] The boundary of the vehicle will be detected using boundary detection algorithm and on the basis of length and weight of the vehicle type of vehicle will be detected.

Most of the number plate detection algorithms fall in more than one category based on different algorithms is as under:

- Image binarization

ISSN: 2277-9655
Impact Factor: 3.785

- Edge detection
- Hough Transform
- Blob detection
- Mathematical morphology.

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.

Edge detection: It is fundamental method for feature detection or feature extraction. In general case the result of applying edge detection of algorithm is an object boundary with connected curves.

Hough Transform: It is a feature extraction technique initially used for line detection. Later on it has been extended to find position of arbitrary shape like circle or oval.

Blob detection: Blob detection is used to detect points or regions that differ in brightness or color as compared to surroundings.

Mathematical morphology: It is based on set theory, lattice theory, topology, and random functions. It is commonly applicable to digital image but can be used in other spatial structures also. Initially it was developed for processing binary images and then extended for processing gray scale functions and images. It contains basic operators such as Erosion, dilation, opening, closing.

COMPARISON TABLE

Author	Year	Description	Outcome
Hanit Karwal, Akshay Girdhar [1]	2015	An exponential increase in number of vehicles necessitates the use of automated systems to maintain vehicle information	An efficient method for recognition for Indian vehicle number plates has been devised.
S. Ramalingam et al. [2]	2014	ANPR part of road safety by detecting and deterring a range of illegal road. A problem identified is the lack of an objective and independent process for benchmarking ANPR systems in the UK	Such plates will show variability in character spacing for assessing ANPR systems which will demonstrate the principles for benchmarking.
Abd Kadir Mahamad et.al [3]	2014	Inspection and recognition of Malaysian vehicles has been done using OCR of the image processing.	It shows good performance for alphabet and vehicle plate recognition.
Kuldeepak et. Al [4]	2012	They introduced that high degree of accuracy has been required by the number plate recognition when roads are busy. ANPR gives us warning for the stolen vehicle which cannot be possible for man handling services.	Optimizing various parameters, they have achieved an accuracy of 98%. Therefore to achieve better accuracy optimization is required.
Muhammad Tahir Qadri et.al [5]	2009	In this project for the recognition the OCR methods is used which is liable to misalignment and to different sizes. The statistical analysis can also be used to	The simulation results show that the system strongly detect and recognize the vehicle against different

ISSN: 2277-9655
Impact Factor: 3.785

		describe the of detection and recognition of the vehicle number plate.	lightening conditions using license plate and it can be implemented at highly restricted areas.
Amr Badr et. Al [6]	2011	This explain an ANPR System using Morphological operations, Histogram manipulation and Edge detection Techniques for plate localization and characters segmentation.	The character reorganization system which is used in this paper for number plate reorganization performs well but under some conditions like blur conditions.
Markus Friedrich et.al [7]	2008	They explained examples which demonstrate the potential of ANPR-systems for transport planning, traffic engineering and traffic operation.	Compared to infrastructure costs or the costs for traffic signals the investment, however, is relatively minor.

COMPARISON OF TECHNIQUES

[A] PROS AND CONS OF LICENSE PLATE EXTRACTION METHOD

Methods	Pros	Cons
Using boundary features	Simplest, fast and straight forward	Barely applied to composite images.
Using global image features	Forthright, independent of position of license plate.	Generate damaged objects.
Using color features	Distorted license plates	Time consuming

[B] PROS AND CONS LICENSE PLATE SEGMENTATION METHODS

Methods	Pros	Cons
Using pixel connectivity	Clear-cut, open, simple , robust	Fails to extract joined or broken character
using projection profiles	independent of character position	noise affects the projection value
using character contours	can get exact character boundaries	slow and may generate distorted shape
using combined features	more reliable	computationally complex

[C] PROS AND CONS OF CHARACTER RECOGNITION METHODS

Methods	Pros	Cons
using pixel values	simple and straightforward	Processing non-important pixel, time-consuming.
using extracted feature	robust to any distortion, fast recognition	Feature extraction takes time. Non-robust feature corrupts the recognition.

CONCLUSION

Various recognition techniques have been developed and number plate recognition systems are today used in various traffic and security applications, such as parking, access and border control, or tracking of stolen cars. Till now, all the LPR systems have been developed using neural networks. This work proposes to implement the system using Gabor filter, OCR and Vision Assistant to make the system faster and more efficient. This paper reviewed various

techniques which have been already used. But there are still some chances for the improvements in the existing techniques and having the better result in term of distorted images.

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