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MSER Region Based Number Plate Recognition System

Mrs. S. Mahalakshmi[1], Ms. P. Shreeroja[2]
[1]Assistant Professor, Dept. of ISE, BMSIT&M, Bangalore-560064, Karnataka, India
[2]B. E Student, Dept. of ISE, BMSIT&M, Bangalore-560064, Karnataka, India

Abstract*: Automatic License Plate Recognition (ALPR) is a kind of image processing and pattern recognition technology for recognizing the vehicle number plate from an image or video of a vehicle. ALPR has become a very important tool in our daily lives because of the unlimited increase of vehicles, which makes it difficult to be monitored by humans. Some of the examples are traffic monitoring, tracking stolen cars, managing parking toll, parking space management and border checkpoints. It's a challenging problem, due to the diversity of plate formats, different scales, rotations and non-uniform illumination conditions during capturing the image. In this paper we discuss about text detection using Maximally Extremal Regions (MSER).Text Detection is an initial stage of Automatic License Plate Recognition (ALPR) which helps in projecting text or numbers in colour way. Therefore by making the initial stage more accurate, would help to make the further process easier.

Keywords*: Automatic License Plate Recognition (ALPR), Maximally Stable Extremal Regions (MSER), Automatic Number Plate Recognition (ANPR),Text Detection, Harris-affine, Hessian-affine, Salient Regions

I. INTRODUCTION

Automatic Number Plate recognition plays a significant role in different applications such as traffic monitoring on highway, automatic toll collection, parking lot access control, identification of plundered vehicles etc. It was first employed in 1976 in United Kingdom at a police station. This type of secured technology is now used in various restricted areas, such as parliament house, military area, Supreme Court etc.

Automatic license plate recognition of the standard number plate is very easy to recognize. But it is very tough to identify if it the number plate has no standard size and pattern. Therefore it requires algorithm for better recognition of number plates. Several techniques were proposed to improve the system by many research groups. ALPR process is divided into six stages. Firstly, Video or image of vehicle is captured using a camera. The captured image may contain noise such as holes and dirt particles. The noise is removed from the image of the vehicle in pre-processing step. In Plate Detection stage, vehicle number plate is extracted from the pre-processed image of the vehicle using various algorithms. The features of vehicle plate which include presence of characters, aspect ratio, color, size and rectangular shape are used to localize the plate. The characters on the vehicle plate are isolated in the plate segmentation stage. The final stage is to recognize the alphanumeric characters present on the vehicle plate. The features of the characters like shape, size and contours of characters can be used for text detection.

Main aim is to furnish such an algorithm that will be able to generate error free recognition of text from the given input image which will help in document digitizing and prevention to the hand written text recognition. In this paper, only text detection using MSER is discussed. Only a part of the process is discussed. Text detection is the process of eliminating the unwanted region to obtain the required region.

II. BRIEF DESCRIPTION OF ALPR

A. Input

The image is obtained from a video or camera, which is the initial step. The image is the vehicle number plate.

B. Pre-Processing

The obtained image is pre-processed. The main aim of image pre-processing is to enhance the image which of low intensity and to reduce the noise.

C. Text Detection

Text detection helps in removing most of the non-text regions which act as noise during the extraction of required text.

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D. Character Segmentation

Character Segmentation is the process of partitioning digital image into multiple segments.

E. Character Recognition

The final stage of ALPR, which is used to recognizes the characters of various size, symbol ,broken plates, etc.

F. Output

The obtained image after several steps, is displayed which can be used in car parking management, toll booth, traffic monitoring and so on.

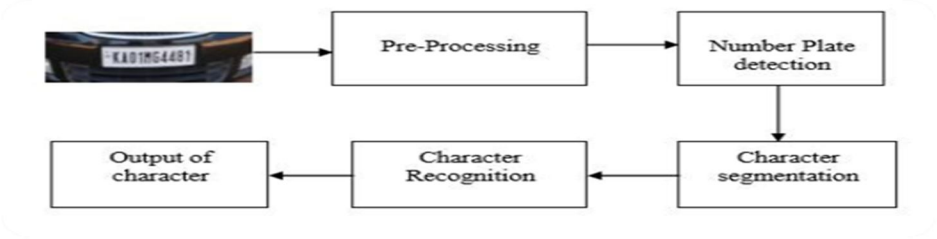

Fig.1 ALPR System

III.TEXT DETECTION USING MSER

Text Detection is the process of localizing various regions of the scene which contain text. It helps in removing most of the non-text regions which act as noise during the extraction of required text. It can acts as a intermediate process between pre-processing and character segmentation or else can replace pre-processing steps. Pre-processing steps involves:

A. Gray scale conversion

t involves conversion of RGB image into grey image.

B. Binarization

Grey image is converted into 0's and 1's binary image.

C. Filters

Median filters used to remove noise from image.

D. Dilation

The boundary of the character is high lightened.

E. Erosion

It removes unwanted lines from the image.

Fig.2 Pre-Processing Steps

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Pre-Processing steps is time consuming compare to MSER text detection.

The car plates are often shown by blue characters on white background or black on yellow, a solid color background. As there is an obvious difference between background and characters of plate in gray scale, the plate region is a typical extremal region. With the pixels in characters varying steadily, these regions satisfy the maximally stable extremal condition and they are MSERs. Therefore, it is easier to detect the text and the get highlighted faster.

Fig.3 Input of Number Plate

Fig.4 MSER Detected Plates

IV.LITERATURE SURVEY

Guanghan Ning et.al tested the licensed plate on 200 image plates in China under different weatheric and lightning conditions, with a rate of detection=100% .With MSER, it is effective to identify the license plates of different size, angles and viewpoints. Based on this, Wei Wang, Qiaojing Jiang, Xi Zhou et.al tested about 450 images of size 720*450 in complex background and the rate of detection is 83.3% with detection time of 400ms per image. They also worked on vehicle face library extracted from one video sequence, where 159 vehicle face images of size 322*131 were tested, with the rate of 95.6% and detection time of 40ms per vehicle. HaoWooi Lim and Young HaurTay worked for license plate character detection technique in nature scene by using the technique of MSER.

Bo Li, In his paper, a VLPR system is proposed. Considering that license plate localization is the most important and difficult part in VLPR system, we present an effective license plate localization method based on analysis of Maximally Stable Extremal Region (MSER) features. Firstly, MSER detector is utilized to extract candidate character regions. Secondly, the exact locations of license plates are inferred according to the arrangement of characters in standard license plates. The advantage of this license plate localization method is that less assumption of environmental illumination, weather and other conditions is made. After license plate localization, we continue to recognize the license plate characters and color to complete the whole VLPR system. Finally, the proposed VLPR system is tested on our own collected dataset. The experimental results show the availability and effectiveness of our VLPR system in locating and recognizing all the explicit license plates in an image.

V. IMPLEMENTATION OF MSER

The MSER feature detector works well for finding text regions. It works well for text because the consistent colour and high contrast of text leads to stable intensity profiles.

A. First of all sweep threshold of intensity from black to white performing a simple luminance thresholding of the image.
B. Then extract the connected components („Extremal Regions‟)
C. Find a threshold when an extremal region is maximally stable.
D. Finally we get the regions descriptors as features of MSER

Fig.5 Input of plate

Fig.6 MSER based detection

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VI. TYPES OF DETECTORS

A. Harris-affine

The Harris affine detector can identify similar regions between images that are related through affine transformations and have different illuminations. These *affine-invariant* detectors should be capable of identifying similar regions in images taken from different viewpoints that are related by a simple geometric transformation: scaling, rotation and shearing. These detected regions have been called both *invariant* and *covariant*.

B. Hessian-affine

The Hessian affine also uses a multiple scale iterative algorithm to spatially localize and select scale and affine invariant points. However, at each individual scale, the Hessian affine detector chooses interest points based on the Hessian matrix at that point.

$$H(\mathbf{x}) = \begin{bmatrix} L_{xx}(\mathbf{x}) & L_{xy}(\mathbf{x}) \\ L_{xy}(\mathbf{x}) & L_{yy}(\mathbf{x}) \end{bmatrix}$$

C. Maximally stable extremal regions(MSER)

To find correspondences between image elements from two images with different viewpoints. This method of extracting a comprehensive number of corresponding image elements contributes to the wide-baseline matching, and it has led to better stereo matching and object recognition algorithms.

D. Salient regions

It extracts features of objects in images that are distinct and representative. The detector uses the algorithms to more efficiently remove background noise and so more easily identify features which can be used in a 3D model. As the detector scans images it uses the three basics of global transformation, local perturbations and intra-class variations to define the areas of search, and identifies unique regions of those images rather than using the more traditional corner or blob searches. It attempts to be invariant to affine transformations and illumination changes.

VII. TYPES OF DETECTORS

MSER consistently resulted in the highest score through many tests, proving it to be a reliable region detector.

A. Region density

In comparison to the others MSER offers the most variety detecting about 2600 regions for a textured blur scene and 230 for a light changed. scene, and variety is generally considered to be good. Also MSER had a repeatability of 92% for this test.

B. Region size

MSER tended to detect many small regions, versus large regions which are more likely to be occluded or to not cover a planar part of the scene. Though large regions may be slightly easier to match.

C. Viewpoint change

MSER outperforms the five other region detectors in both the original images and those with repeated texture motifs.

D. Scale change

Following Hessian-affine detector, MSER comes in second under a scale change and in-plane rotation.

E. Blur

MSER proved to be the most sensitive to this type of change in image, which is the only area that this type of detection is lacking in. Note however that this evaluation did not make use of multi-resolution detection, which has been shown to improve repeatability under blur.

F. Light change

MSER showed the highest repeatability score for this type of scene, with all the other having good robustness as well.

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VIII. APPLICATIONS

A. Image understanding

When images can be automatically understood and indexed by computer, the efficiency of running digital libraries and video database system will be greatly improved.

B. Content-based image filtering

In content based filtering, image spam can be detected and pornography, reactionary and fraud words can be easily filtered.

C. Super map

Text extraction technology can be applied to detect scene text from images taken with laptops, phones and other equipment, so as to be applied to maps, navigation, automatic translation, foreign-related tour guides, walking robots and intelligent monitoring system and also used as visual impaired peoples assistance.

D. Vehicle testing

Vehicle license and scene subtitles have many features in common, so text extraction can be used to supervise the traffic in real time. After text extraction from highway video flow, the traffic situation can be overseen and vehicle licenses can be recognized easily from traffic accidents, which can improve the efficiency of the transportation systems.

E. Optical character reading

Reads text from paper and translates images into a form that computer can manipulate (for example, into ASCII codes). An OCR system enables to take a book, feed it directly into an electronic computer file, and then edit the file using a word processor.

F. Automatic localization of postal addresses on envelopes and Automatic Geo coding:

Postal automation tries to get the mail from the sender to the recipient quickly, in a reliable and economical process.

G. Text extraction in video sequences

Caption text or superimposed text provides valuable information about contents in images and video sequences.

H. Wearable applications

Wearable devices such as goggles, phones, cameras are created for detecting text elements and can be converted into voice for blind peoples.

I. Online electric goods search

Online shopping applications using mobile phone allows customer to type the name of goods and get required information about it with images and descriptions.

IX. CONCLUSIONS

Here we have discussed MSER region based text detection used in Automatic License Plate Recognition (ALPR). Automatic recognition of car license plates plays an important role in traffic surveillance systems. Such system which is applied in parking areas, highways, bridges and tunnels, can help a human operator and improve overall quality of a service. Text detection is a process of localizing various regions and helps in removing the non-text regions and extraction of the required text. MSER region based detection is mainly for detecting the text and which eliminates the non-text region making it efficient for following steps in ALPR(segmentation and recognition). MSER detects near about 2600 regions for image and gives greater results in region size, blur, viewpoint change, scale change and light changes. The method which detects the character with high percentage accuracy is used for text detection.

Comparatively MSER provides about 95% efficiency approximately, thereby is being the initial step it could provide a efficient license plate recognition system by making later process easier. MSER is mainly to find the text region ,hence it can be used in place of pre-processing steps because time consuming of pre-processing steps is more.

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REFERENCES

[1] Upendra kumar agrawal, narendra kumar," mser region based number plate recognition system", international journal of advanced research incomputer engineering & technology (ijarcet) volume 5, issue 9, september 2016
[2] Uma b. Karanje ,rahul dagande," survey on text detection, segmentation and recognition from a natural scene images",international journal of computer applications (0975 – 8887) volume 108 – no. 13, december 201
[3] Kethineni venkateswarlu, sreerama murthy velaga," text detection on scene images using mser", international journal of research in computer and communication technology, vol 4,issue7 , july-2015
[4] Wei wang, qiaojing jiang, xi zhou, wenyin wan," car license plate detection based on mser", 2011 ieee
[5] Leelawati gaddam, sukanya h.rane, jayshri kishan baspure, priyanka b.gagare, prof. Amol baviskar," license plate recognition", international journal of computer science and mobile computing, vol.3 issue.9, september- 2014, pg. 492-495
[6] Bo li, bin tian, qingming yao*, kunfeng wang," a vehicle licenseplate recognition system based on analysis of maximally stable extremal regions", 2012 iee
[7] Chirag patel, dipti shah and atul patel, "automatic number plate recognition system (anpr): a survey", international journal of computer applications volume 69, no.9, may 2013, pp 21-33
[8] Anand sumatilal jain, jayshree m. Kundargi, "automatic number plate recognition using artificial neural network", international research journal of engineering and technology (irjet) volume. 02, issue. 04, july 2015, pp 1072-1078
[9] Amirgaliyev beibut, kairanbay magzhan, kenshimov chingiz, "effective algorithms and methods for automatic number plate recognition", ieee international conference on application of information and communication technologies (aict), 2014
[10] Priyanka muchhadiya, prof. Poorvi h. Patel,"the different image processing techniques to detect text from natural images: a survey ",stm journals,201
[11] Sreeja k soman, sindhu m.p ," scenetext detection and recognition innatural images with maximally stable extremal regions and stroke width transform ",ijcsmc, vol. 3, issue. 9, september 2014, pg.663 – 66
[12] Annie j. Zenath m.s, s. Shriram ," licence plate localization and recognition using mser and swt algorithms ",second international conference on electrical, information and communication technology (iceict 2016
[13] Qixiang ye, david doermann, "text detection and recognition in imagery: a survey", ieee transactions on pattern analysis and machine intelligence, vol. 37, no. 7, july 2015

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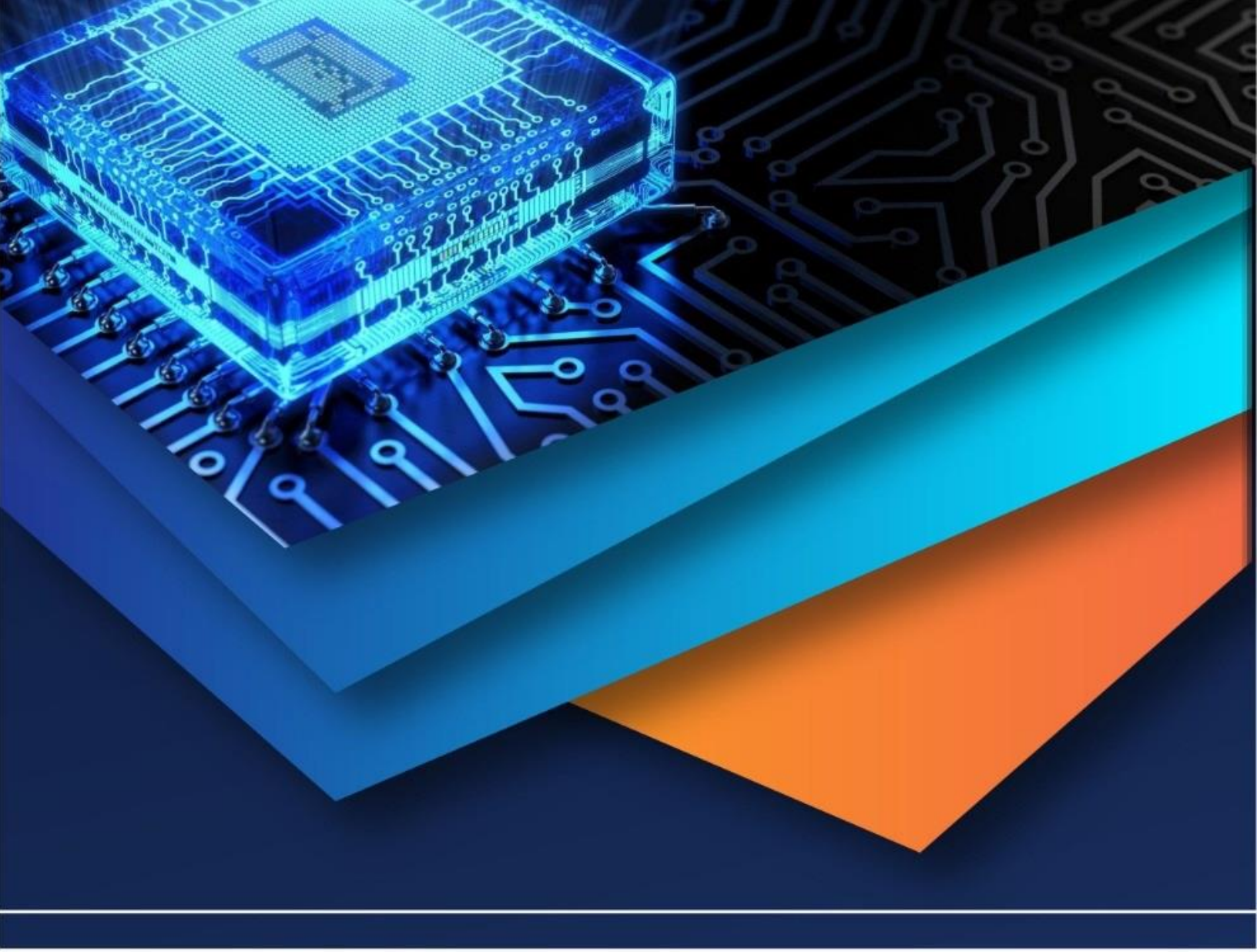

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