International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 05 | May 2019 www.irjet.net p-ISSN: 2395-0072

AUTOMATIC NUMBER PLATE RECOGNITION USING CCA ALGORITHM AND RANSAC TECHNIQUE IN IOT

Sowmiya sree R[1], Avudaiappan T[2]

[1,2]Department of Computer Science and Engineering, K. Ramakrishnan College of Technology Trichy, Tamil nadu, India

---

Abstract - In Image processing, once the vehicle image is being captured in which number plate clearly visible and fine texture pattern, then the further processing of the image is carried out. It has many steps: resize the image resolution, removal of noise from image, and conversion of the image from RGB to gray and then Binary (black and white). RGB colour observer is a criterion instrument in picture examination that permits us to separate the colour data for the pre-preparing in this procedure. The exploratory outcomes demonstrate that the planned strategy is about compelling and practical. Be that as it may, there is opportunity to get better in calculation because it doesn't work viably in circumstances beneath dim lights and mistakes as of various states of characters removed. The Automatic vehicle number plate reorganization is one of the solutions of such kind of problem. There is a number of methodologies but it is challenging task as some of the factors like high speed of vehicles, languages of number plate & mostly non-uniform letter on number plate effects a lot in recognition. The Number Plate Recognition (NPR) system have many application like payment of parking fees, toll fee on highway, traffic monitoring system, border security system, signal system etc. In this research, the different method of vehicle number plate recognition is discussed. The systems first detects the vehicle and capture the image then the number plate of vehicle is extracted from the image using image Segmentation optical character recognition technique is used for the character recognition. Then the resulting data is compared with the database record so we come up with the Vehicle Number Plate such as is observed that developed system successfully detects & recognizes the vehicle number plate on real image even when the pixel is of low resolution.

1. INTRODUCTION

The ANPR (Automatic Number Plate Recognition) plays an important role in many systems like traffic monitoring system, Crime detection system, Stolen vehicle detection etc. Thus, ANPR is used by the city traffic department to monitor the traffic as well as to track the stolen vehicle. Though ANPR is a very old research area in image processing but still it is s evolving year by year, because Detecting the number plate from the image or from the video is not that easy task as like counting the vehicle from stream of video. So far many of the researchers came with their own algorithm to detect the number plate, but each has some limitations. For some images it works perfectly, and for some images it is not working properly. That's the reason this area is still growing and still imperfect. Detecting the number plate is the challenging task as the number plate writing style is changing from country to country. In case of India the number plate writing style changes from state to state. In India the number plate is different for two wheelers and four wheelers. For four wheelers the number plate's backgrounds are also different, i.e. yellow for tourist and white for private cars. These are the basic challenges keep in mind before implementing the ANPR system. ANPR has predefined four basic steps to recognize the number plate as explained in the various research papers and journal paper.

i)Image Capture: In this step video image has to Be captured by any standard camera or by extracting the interested frame from stream of video . Capturing the image from the video stream and its requires an additional work.

ii)Image Preprocessing: Once the interested image is being captured in which number plate clearly visible and fine texture pattern, then the further processing of the image is carried out. It has many steps: resize the image resolution, removal of noise from image, and conversion of the image from RGB to Gray and then Binary (black and white).

iii)Character segmentation: After preprocessing the number plate region of the image is extracted.

iv) Optical Character Recognition (OCR): Electronic conversion of handwritten or printed text images into machine - encoded text. Here OCR used to recognize the number from the segmented image

1.1 Abbreviations and Acronyms

ANPR	Automatic Number Plate Recognition
OCR	Optical Character Recognition
IP	Image Processing
MDL	Minimum Description Length
LPR	License Plate Recognition
IFT	Indirect Fourier Transform

ALPD	Automatic License Plate Detection
ERs	Extremal Regions
SVMs	Support Vector Machines
RANSAC	Random Sample Consensus
CCA	Canonical Correlation Analysis
GMIs	Gradient Magnitude Intensities
LIM	Local Intensity Minimum
VNPI	Vehicle Number Plate Identification
NPR	Number Plate Recognition

1.2 SCOPE OF WORK

This research presents an online highly accurate system for Automatic Number Plate Recognition (ANPR) that can be used as a basis for many real-world ITS applications. The system is designed to deal with unclear vehicle plates, variations in weather and lighting conditions, different traffic situations, and high-speed vehicles. This paper addresses various issues by presenting proper hardware platforms along with real-time, robust, and innovative algorithms. We have collected huge and highly inclusive data sets of Persian license plates for evaluations, comparisons, and improvement of various involved algorithms. The data sets include images that were captured from cross roads, STREETS, and highways, in day and night, various weather conditions, and different plate clarities. Over these data sets, our system achieves 98.7%, 99.2%, and 97.6% accuracies for plate detection, character segmentation, and plate recognition, respectively. The false alarm rate in plate detection is less than 0.5%. The overall accuracy on the dirty plates portion of our data sets is 91.4%. Our ANPR system has been installed in several locations and has been tested extensively for more than a year. The proposed algorithms for each part of the system are highly robust to lighting changes, size variations, plate clarity, and plate skewness. The system is also independent of the number of plates in captured images. This system has been also tested on the three other Iranian data sets and has achieved 100% accuracy in both detection and recognition parts. To show that our ANPR is not language dependent, we have tested our system on available English plates data set and achieved 97% overall accuracy.

2. MODULES

2.1 IMAGE SEGMENTATION

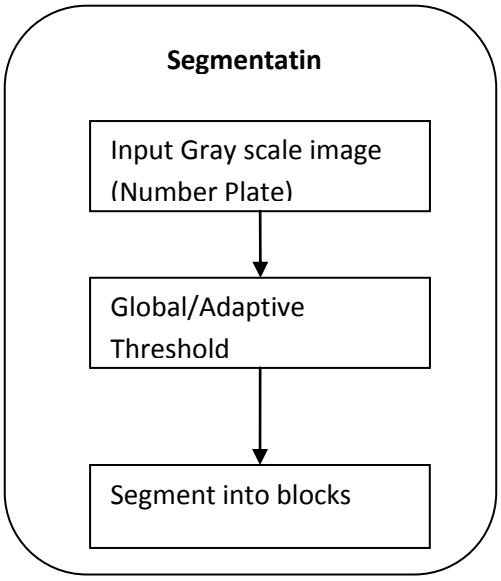

Fig 1 Image Segmentation architecture

As shown in Figure 1, the detection process is initiated by a gray scale image. The main reason is that color cannot be used as a discriminative feature in detecting dirty plates. Moreover, processing gray scale images not only helps to reduce the processing time, but also makes the algorithm more robust to color changes caused by different lighting condition throughout the day. Hence, detection algorithm is directly applicable to both color and monochrome cameras. In the next step, an algorithm to detect moving objects in two consecutive video frames is applied. There are a variety of methods to calculate the dynamic parts of images based on the comparison with previous video frames. The window size parameters, m and n, are chosen based on the characters size in the region. As found empirically, the thresholding window based on the local mean outperforms other methods like local Gaussian and local median windows. After thresholding, the intersection of the two images from the two last steps (morphology and thresholding) is determined. The intersection helps to eliminate irrelevant regions from further processing. In system the character size parameters must be set manually based on the setup and the application. Such possibility can be seen as a common feature in many industrial ANPR systems. As a matter of fact, similar to other industrial ANPR systems, the character size parameters for all relevant plate formats must be specified to our system. Any plates with unspecified formats (out of the pre-known set of formats) cannot be recognized.

2.2 IMAGE DETECTION

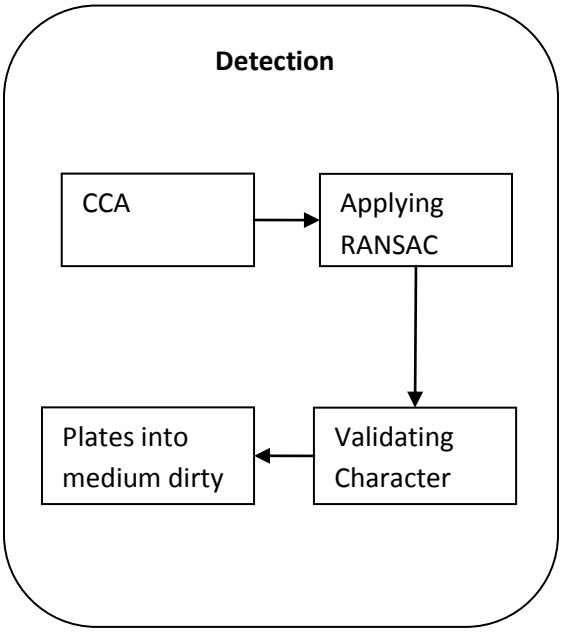

Fig 2 Image detection architecture

After extracting the regions that are most likely to include plates, as explained in previous section, a more accurate vehicles plates localization is performed based on the concept of Random Sampling Consensus (RANSAC). RANSAC is an iterative algorithm used to fit a robust mathematical model to a set of observed data [40]. This method ignores the utliers and finds the best model to the rest of the given data. The main application of RANSAC in machine vision field is in stereo vision, and specifically in finding the Fundamental Matrix [50]. In this paper, a revised version of RANSAC algorithm is designed and exploited in license plate localization process.

2.3 IMAGE RECOGNITION

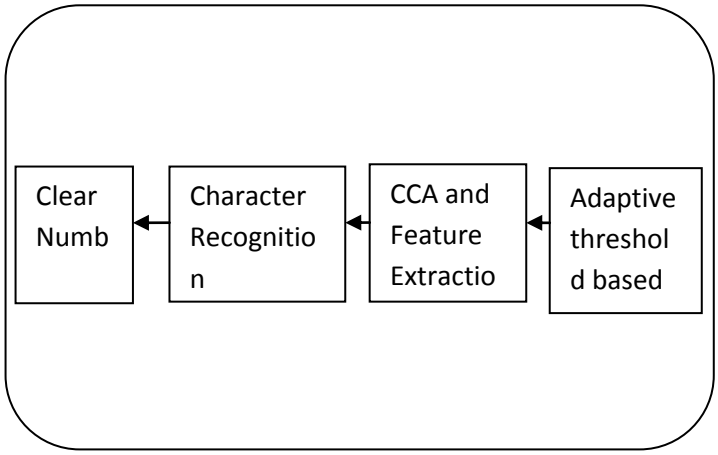

Fig 3 Image Recognition architecture

Connected Component Analysis, CCA, is one of the most widely selected algorithm for the initial step of character recognition in various segmentation methods after detecting the exact location of the plates in a captured image, a binarization process is performed on the detected plates. Several thresholding methods have been proposed for the binarization process at this step. In the results of applying some state-of-the art thresholding algorithms on clean and dirty plates Therefore, a small deviation from α value leads to desired results. According to Fig. 8, for clean plates all the thresholding methods achieve the same character segmentation results, however, for the dirty plates, the segmentation process using the proposed method outperforms the conventional algorithms. The proposed thresholding Algorithm helps to increase the detection accuracy for dirty plates. The advantage of the proposed thresholding method lies in its adaptive nature for setting different parameters of clean and dirty plates. Characters class and negative set consists of the non-characters class is the feature of the positive instance and is the ith feature of the kth negative sample in the data set. The numerator shows the discrimination between the positive and negative sets. The denominator shows the discrimination within each of the two sets. In this paper, features were sorted based on their F-score value. As per experiments, the first 90% of the strongest features presented the best results in the classification process.

3. CONCLUSION

In this research, Number plate recognition system mainly consists of four steps such as vehicle image capture from video, preprocessing, character segmentation and character recognition In this paper different Number Plate Identification strategies have been examined in subtle elements which were utilized by several researchers. The Vehicle Number Plate Identification (VNPI) framework predominantly includes three noteworthy strides, number plate localization, character division and character identification. Also utilization of various methods and techniques which are proposed by researchers beforehand are discussed. We have even mentioned the basic and common steps involved in the vehicle number plate identification. From the papers surveyed, it is realized that there are different methods and algorithms used for license plate detection, character segmentation and character recognition. In character recognition, methods like template matching are used in future dirty picture should be eradicated totally.

4. REFERENCES

[1]Rohollah Mazrae Khoshki1 , Sami Oweis, Shumei Wang , George Pappas, Subramaniam Ganesan"FPGA Hardware Based Implementation of an Image Watermarking System",International Journal of Advanced Research in Computer and Communication Engineering., Vol. 3, Issue 5, May 2014

[2]C. Anagnostopoulos, I. Anagnostopoulos, V. Loumos, and E. Kayafas, "Alicense plate-recognition algorithm for intelligent transportation system applications", IEEE Trans. Intell. Transp. Syst.,vol. 7, no. 3, pp. 377–392, Sep. 2006.

[3] Hanit Karwal, Akshay Girdhar "Vehicle Number Plate Detection System for Indian Vehicles", IEEE International Conference on Computational Intelligence & Communication Technology, 2015.

[4] Rahim Panahi, Iman Gholampour "Accurate Detection and Recognition of Dirty Vehicle Plate Numbers for High-Speed Applications", IEEE transactions on intelligent transportation systems.,2016.

[5] Sean Lawlor, Timothy Sider, Naveen Eluru, Marianne Hatzopoulou, and Michael G. Rabbat"Detecting Convoys Using License Plate Recognition Data", IEEE Transactions on Signal and Information Processing over Networks.,2016.

[6] Anisha Goyal, Rekha Bhatia "Various Techniques for Number Plate Recognition-A Review", International Journal of Computer Applications(0975 –8887)Volume 143 –No.11, June 2016.

[7] Sarbjit Kaur, Sukhvir Kaur "An Efficient Approach for Number Plate Extraction from Vehicles Image under Image Processing", International Journal of ComputerScience and Information Technologies, Vol. 5 (3) , 2014.

[8] S. Ramalingam, M. Rhead, and R. Gurney "Impact of character spacing on the performance of Automatic Number Plate Recognition (ANPR) systems through simulation", Security Technology (ICCST), International Carnahan Conference on. IEEE, 2014.

[9] Kapil Bhosale, Jagdish Jadhav, Sumit Kalyankar, Prof. R. R. Bhambare "Number Plate Recognition System for Toll Collection ", International Journal of Emerging Technology and Advanced Engineering,Volume 4, Issue 4, April 2014.

[10] Cosmo H.Munuo, Dr. Michael Kisangiri "Vehicle Number Plates Detection and Recognition using improved Algorithms: A Review with Tanzanian Case study", International Journal Of Engineering And Computer Science,Volume 3 Issue 5, May 2014, Page No. 5828-5832.

[11] Rajshree Dhruw, Dharmendra Roy " Automatic Number Plate Recognition System", International Journal of Computer Science and Mobile Computing IJCSMC, Vol. 3, Issue. 7, July2014, pg.6 –12.

[12]Amir Hossein Ashtari, Md. Jan Nordin and Mahmood Fathy "An Iranian License Plate Recognition System Based on Color Features ", IEEE transactions on intelligent transportation systems 2014.

[13] Christos Nikolaos E. Anagnostopoulos, Ioannis E. Anagnostopoulos, Vassili Loumos, and Eleftherios Kayafas, "A License Plate-Recognition Algorithm for Intelligent Transportation System Applications," pp. 377-392, 2006.

[14] J. B. Jiao, Q. X. Ye, and Q. M. Huang, "A configurable method for multistyle license plate recognition", Pattern Recognit.,vol. 42, no. 3, pp. 358–369, Mar. 2009.

[15] Prathamesh Kulkarni, Ashish Khatri, Prateek Banga, and Kushal Shah, "Automatic Number Plate Recognition (ANPR)," in RADIOELEKTRONIKA. 19th International Conference,

2009.

[16] Ch.Jaya Lakshmi, Dr.A.Jhansi Rani, Dr.K.Sri Ramakrishna, and M. KantiKiran, "A Novel Approach for Indian License Recognition System", International Journal of Advanced Engineering Sciences and Technologies,vol. 6, no. 1, pp. 10-14, 2011.

[17] Zhen-Xue Chen, Cheng-Yun Liu, Fa-Liang Chang, and Guo-You Wang, "Automatic License -Plate Location and Recognition Based on Feature Saliance" , IEEE Transactions on Vehicular Technology,vol. 58, no. 7, pp. 3781-3785, 2009.

[18] GarimaR.Yadav,H.K.Waghmare,"Automatic Indian Licenses Plate Recognition System", International Journal of Advanced Research in Computer Science and Software Engineering,Volume 4, Issue 11, November 2014 ISSN: 2277 128X.

[19] Priyanto Hidayatullah, Nurjannah Syakrani, Ida Suhartini, Wildan Muhlis, " Optical Character Recognition Improvement for License Plate Recognition in Indonesia ",Computer Modeling and Simulation (EMS),2012 Sixth UKSim/AMSS European Symposium on Date of Conference:14-16 Nov. 2012,Page(s):249 --254.

[20]Shyang-Lih Chang, Li-Shien Chen, Yun-Chung Chung, and Sei-Wan Chen, "Automatic license plate recogniton",IEEE Transactions on Intelligent Transportation Systems, vol. 5, no. 1, pp. 42 -53, 2004