

A Real Time Car License Plate Detection and Recognition System

Aditi D. Parab
University of Mumbai
Pillai HOC college of Engineering
and Technology
aparab@mes.ac.in

Asst. Prof. Upendra Patil
University of Mumbai
Pillai HOC college of Engineering
and Technology
upatil@mes.ac.in

Asst. Prof. Asokan S.
University of Mumbai
Pillai HOC college of Engineering
and Technology
aselvaraj@mes.ac.in

Abstract—In this paper we present a real time Car License Plate Detection and Recognition system. In this system there is fixed camera which is streaming live data. To overcome the problem of fonts, different plate colors clarity of capturing devices and variant light intensity the License Plate detection method using Morphology is used to recognize the Number plate using classifiers. The system detects the number plate of various background colors with English font under variant illumination conditions.

Keywords: Canny edge detection, Wavelet Transform, Neural Networks, template matching, OCR

I. INTRODUCTION

Nowadays license plate recognition and detection is done for security purposes in the premises of the organizations, institutions, malls, parking areas, etc. The detection of number plate is ambiguous during night time when all the head lights of vehicles are switched on. The license plate detection under various light conditions is rather difficult and robustness is less in such situations. Number plate fonts is of major concern since fonts of number plate can vary from state to state. When Number plate is tilted or the distance between the license plate and capturing device is more the resolution becomes low. The light intensity hue and saturation of the image is considered to identify our ROI. Sometimes the detection of white color car with white background color number plate becomes the challenging job. Edge detection techniques such as sobel, prewitt, canny and Roberts method[18] are adopted to detect the edges of the license plate extracted from an image. In bright light environment such as sunlight the chances of detection of number plate with high percentage of uncertainty is more. Wavelet transform such as Discrete wavelet transform[16] are used to perform multi-resolution analysis. In order to remove all these ambiguities and to make the system more robust we have proposed the detection and recognition algorithms to add more accuracy in the system.

II. RELATED WORKS

AllamMousa [13] proposed an edge detection named as canny edge detection method to detect a number plate in various light environment. A gauss filter is used to recognize a more certain or clear ROI(Region of Interest). SarbjitKaurand Sukhvirkaur [4] proposed the efficient approach for number plate extraction and edge detection using sobel operator. A Kang, D. J [17] introduced a dynamic programming based extraction method to detect the four numbers of the license plate which is having very fast computing time. Another method of number plate detection is based on morphology. Sneha G. Patel [12] recommended the morphological operations for smoothening the contour of the license plate and neural networks for character recognition. Teena Singh Rajput [1] proposed morphological operations for edge extraction and Otsu method for segmentation of number plate. SuproakashDey, AmitavaChoudhury and Joydeep Mukherjee [8] presented a method for number plate localization and recognition on morphological operations. AshwiniDama, Prof. Todmal S.R.[5] in

this paper the morphological operations are adopted for different structuring elements. PhalgunPandya, Mandeep Singh [14] introduces a number plate recognition system based on template matching and an approach towards the localization of license plate based on morphology. Sami Ktata, FaouziBenzarti and Hamid Amiri [11] presented a robust system for detection of license plate by using Gabor filters. These are oriented filters which is used for texture analysis in any environmental conditions. SangeetBhuwal, Amandeep and Mahesh Kumar [3] proposed the haar wavelet transform for number plate recognition which decreases the training time, noise of plate region and intensity. Vijay Laxmi and Dr. Harish Rohil [9] presented a feature extraction of number plate using haar wavelet transform which increases the recognition rate.

III. PROPOSED SYSTEM

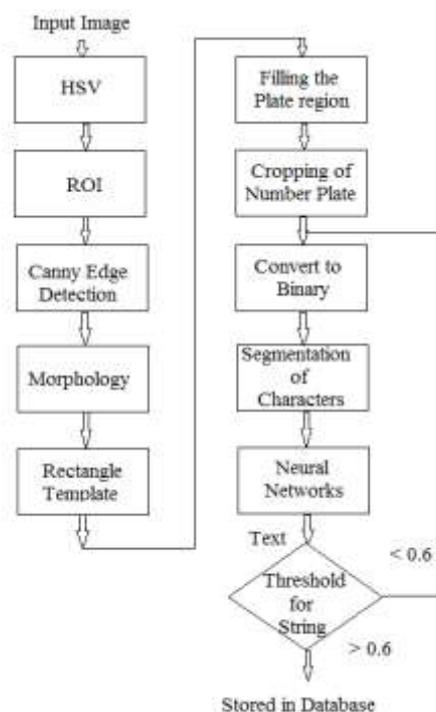


Fig. 1 Flow of System

The proposed system consists of three modules as follows: First module consists of number plate detection, second is optical character recognition and third is string comparison.

In first module the number plate is detected based on the hue, saturation and intensity of variation of the image as shown in Fig.3 from the original image as shown in Fig.2.



Fig. 2 Original Image



Fig. 3 License Plate detected from original image.

Fig.3 shows the detected license plate in the night time when background light intensity is weak. Hue corresponds to wavelength, saturation corresponds to purity of the color image and intensity which corresponds to brightness should vary between 0.3 to 0.47 percentage for proper detection of number plate. When intensity of headlights under semi white light conditions are satisfied then Region of interest (ROI) is taken for further processing. Canny edge detection method is used to detect the license plate. [6],[2],[13]. The morphology process preserves the horizontal and vertical edges. A polygon or rectangle is formed which is filled by closing operation and opening is done to get the boundary of the plate region. Cropping of the plate is carried out by approximately considering the outer boundary of the filled image as shown in Fig 4 below. This cropping is done after filling the holes in the image with the help of closing operation compiled in Matlab[18]. If we consider the rear view of the car image the location of the plate region might vary from the exact view of the fixed camera. Accuracy is more in the morning and night vision depending on the resolution of the camera. In this system the night time live streaming detection is exact as compared to the daytime live detection.



Fig. 4 Cropped license plate

In second module cropped image is converted to binary image as shown in Fig.5. Segmentation [7], [10] is carried out to take out

the individual characters from the entire number plate as shown in Fig.6 which is concerned with the character recognition stage[15]. In this stage the characters which are segmented are recognized Neural networks [18],[19] based on hybrid method are used in character recognition stage to extract the text from license plate. Hybrid method in the sense Adaptive network based fuzzy interference system is adopted[20]. A suitable threshold in string comparison module which is used to compare the text from the stored database as shown in Fig. 1.



Fig. 5 Binary Image



Fig. 6 OCR

IV. EXPERIMENTAL RESULTS

The result of detection and recognition is giving 90% of accuracy in night when compared with day time intensity. The performance of the entire system in real time streaming is better when the capturing device is steady under variant light environment.

V. CONCLUSION

Real time vehicle identification system plays an important role in detecting security threat. The system uses MATLAB R2010a and image processing for its implementation. The system robustness can be increased if high resolution camera is used.

REFERENCES

- [1] Teena Singh Rajput, "Automatic Vehicle Number Plate Recognition Using Morphological Edge Detection and Segmentation", in International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 5, Issue 1, January 2015).
- [2] Mrs. Anandhi, Dr. M. S. Josephine, Dr. V. Jeyabalaraja and S. Sathiyaraj, "Comparison of canny and sobel edge detection techniques", in int journal of engineering science and research technology, July 2015.
- [3] Sangeet Bhuwal, Amandeep and Mahesh Kumar, "Automatic Number Plate Recognition Using Haar Wavelet", in International Journal of New Technologies in Science and Engineering Vol. 2, Issue. 1, 2015.
- [4] Sarbjit Kaur and Sukhvirkaur, "An Efficient Approach for Number Plate Extraction from Vehicles Image under Image Processing." in International Journal of Computer Science and Information Technologies, Vol. 5 (3), 2014.
- [5] Ashwini Dama, Prof. Todmal S.R., "Number Plate Recognition using morphological operations", in International Journal of Scientific & Engineering Research, Volume 5, Issue 5, May-2014.
- [6] Thomas K.T. and Vaijayantimala J., "A Review of Automatic License Plate detection using edge detection method", in international journal for research in applied

- science and engineering technology, Vol.2, issue V, May 2014.
- [7] Mr. G.T. Sutar and Prof. Mr. A. V. Shah, “Number Plate Recognition Using an improved segmentation”, in int journal of innovative research in science, engineering and technology, Vol. 3, issue 5, May 2014.
- [8] SuproakashDey, AmitavaChoudhury and Joydeep Mukherjee, “An Efficient Technique to Recognize License Plate using Morphological Edge Detection and Character Matching Algorithm”, in International Journal of Computer Applications (0975 – 8887) Volume 101– No.15, September 2014.
- [9] Vijay Laxmi and Dr. Harish Rohil, “License Plate Recognition System Using Haar Wavelet”, in International Journal of Scientific & Engineering Research, Volume 5, Issue 9, September-2014.
- [10] V. LaxshmiPriyaand K. Perumal, “Detecting the car number plate using segmentation”, in int journal of Engineering and computer science, Vol. 3, Issue 10 October 2014.
- [11] Sami Ktata, FaouziBenzarti and Hamid Amiri, “ License Plate Localization using Gabor filters and Neural Networks”, in Journal of Computer Science 9 (10): 1341-1347, 2013.
- [12] Sneha G. Patel, “Vehicle License Plate Recognition using morphology and Neural Network ”, in International Journal on Cybernetics & Informatics (IJCI) Vol.2, No.1, February 2013.
- [13] AllamMousa,“Canny Edge detection based vehicle plate recognition”, in International Journal of Signal Processing, Image Processing and Pattern Recognition Vol. 5, No. 3, September, 2012.
- [14] PhalgunPandya, Mandeep Singh, “Morphology Based Approach To Recognize Number Plates in India” , in International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-1, Issue-3, July 2011.
- [15] Anuja P. Nagare, “License Plate Character Recognition Systemusing Neural Network”, in int journal of computer applications,Volume 25– No.10, July 2011
- [16] Kuo-Ming Hung and Ching –Tang Hsieh, “ A Real-Time Mobile Vehicle License Plate Detection and Recognition” in Tamkang Journal of Science and Engineering, Vol.13, No.4, pp.433-442, 2010
- [17] A Kang, D. J; "Dynamic programming -based method for extraction of license numbers of speeding vehicles on thehighway”, in International Journal of Automotive Technology, pp. 205-210, 2009.
- [18] Gonzalez, R.C. Woods, R.E.,“ Digital image processing, Prentice Hall”, 2008.
- [19] Gonzales, Rafael C. and Richard E. Woods, “ Digital Image Processing. 2nd ed. Englewood Cliffs”, NJ: Prentice-Hall, 2002.
- [20] Jang,J.-S.R., “ANFIS: Adaptive network based fuzzy interference system”, IEEE Transactions on systems, Man, and Cybernetics, Vol. 23, No.3, pp. 665-685, May 1993.