

Analysing and Recognition of Automatic License Plate Using Fuzzy Logic

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ABSTRACT

In this paper a detailed study on Automated License plate recognition is given. In this paper we are proposing a method for implementing Automatic License Plate Recognition using Speed up robust feature matching SURF technique for plate detection and Advanced Radial basis function for matching characters. Automatic License Plate Recognition algorithms generally consist of following steps for effective processing: - 1) Identification and detection of the license plate area; 2) Segmentation of the plate characters; and 3) Optical Character Reader. Image processing techniques such as filtering, edge detection, Thresholding etc are normally used to perform the first two steps of the ALPR process. Third step is mainly used to recognize each character. This proposed work has been implemented by image processing Toolbox under the MATLAB software. The labelling of components selects the useful data from a large collection of data. Normally, in this approach, transformation is used to manipulate raw data to produce a single input and normalization is used to manage the data in a more suitable way so that ease to access.

Keywords: SURF, RBF, Neural Network, OCR, MATLAB, Segmentation, Radial Basis Function and Ransac.

1. INTRODUCTION

Computer vision techniques have led to new innovation in the automation in license plate localization. Number plate localization has been a major and vital part of the license plate recognition system. This technique can solve various traffic management problems such as Highway toll collection, Parking management, vehicle Theft detection etc. In this approach Character Recognition is a technique which is most widely used for authentication of person as well as document. Character Recognition is performed On-line as well as Off-line. In Off-line, each character is differentiating by analysis of character shape and comparing the features whereas, In On-line Recognition, computer recognizes the character as they are drawn. Various methods used in character recognition are Image Pre-processing, Segmentation, Feature Extraction, Classification and Recognition and Pattern Matching. Techniques used in this are Neural Network Algorithm, Image processing Toolbox created in MATLAB software, SURF Feature, Ransac Algorithm and Radial Basis Function

2. PROPOSED METHOD

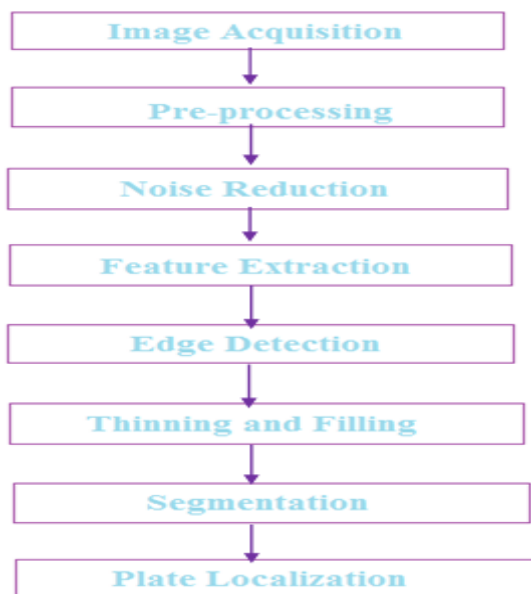


Fig 1 Block Diagram

1) Image Acquisition: In Image Acquisition, this approach acquires an input in the form of scanned image and also provides the location from where it is acquired. All the scanned images which we are using must be in a specific format such as JPEG, JPG etc. These images can be input to the system through any type of suitable input device such as scanner, digital camera or any analog or digital input device.. Then we resize this image. That image is shown as fig 2.



Fig 2 Resized Input Image

2) Pre-Processing: The pre-processing consist a series of steps which are performed on the raw data to prepare it for another processing. It basically consists of three tasks labelling of connected components, thresholding and removal of noise which are performed in a sequential manner. The labelling of components selects the useful data from a large collection of data Normally, in this approach, transformation is used to manipulate raw data to produce a single input and normalization is used to manage the data in a more suitable way so that ease to access

i)RGB to Gray Conversion: First of all the coloured image is converted into a gray colour format and the scanned image is stored in a JPEG format but we can also use the other formats of images like BMP, JPG etc for character recognition. There is a specified format for these images called RGB format. Converted gray scale image compromises of number of pixels which are expressed within a minimum and maximum value and lies between a range of 0 to 255 where 0 shows the total absence i.e. black and 1 shows the total presence i.e. white. In this process each pixel contains a single set called black and white and consists of shades of gray colour where black colour shows the weakest intensity and white colour shows the strongest. Gray Scale image is shown in fig 3.



Fig 3 Gray Scale Image

3) Noise Reduction: connected line segments can be affected by Noise results to disconnection of line segments, bumps, and also creates gaps in lines and filled loops which are created by either scanning device or any other suitable writing approach. A process, named as Median filter is used for reducing the noise. By using Filter process of Median, the value of a point consisting of pixels is replaces by the median of gray levels near of that pixel.

4) Edge Detection Approach and Erosion: Edge detection process is used to find the boundaries of objects within images. To produce the pre-processed image for segmentation, these operations are performed in the last two stages. Edge detection consists of mainly three steps:-

- a. Smoothing
- b. Edge enhancement
- c. Edge localization

Feature Extraction process is shown in fig 4.

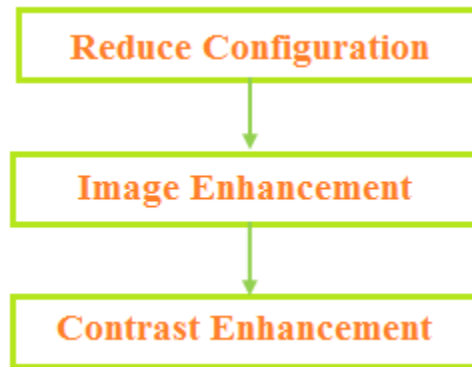


Fig 4 Feature Extraction Process

i) **Reduce Configuration:** We have used the dilation and erode technique to reduce the configuration. This process is shown in fig 5.



Fig 5 Image Configuration

ii) **Image Enhancement:** Convolution method is used for enhancing the image. Enhanced image is shown in fig 6.



Fig 6 Enhanced Image

iii) **Contrast Enhancement:** Adjust image intensity values or colormap for enhancing the image contrast using the MATLAB toolbox syntax Adjust. This process is shown in fig 7.



Fig 7 Image Contrast Enhancement

5) Detection/Localisation:

i) **SURF:** For Licence Plate Localization, a method is used named as SURF feature extraction. SURF method which is used for feature detection and extraction is based on Hessian Matrix. SURF method is basically dependent on the determinant of Hessian Matrix. After locating the images, the edge is dilated. Edge Detection is shown in fig 8.

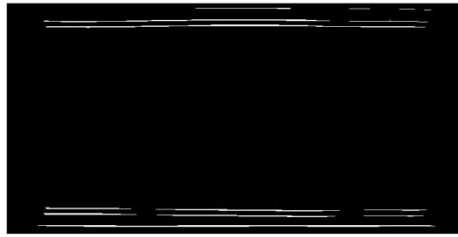


Fig 8 Edge Detection

6) Thinning: This approach is morphological operation process. It is used in binary image to remove the foreground pixels from the scanned images. This process takes the archaeological image as an input and after performing the thinning process it provides an thinned image of one pixel width characters. This approach can be done by using two types of algorithms: Sequential and parallel Thinning algorithms.

Thinning and Filling process is shown in fig 9.



Fig 9 Thinning and Filling

7) Segmentation: Segmentation is a process in which we get individual number digit and alphabet image. This process is shown in fig 10.



Fig 10 Segmented Im

CONCLUSION

The main aim of this paper is to simulate and examine the results of Automatic license plate recognition in image processing. Number plate (RJ27 TA 1337) used in this paper represent Rajasthan by RJ. So in this way, by number plate we can recognise the state to which particular state the vehicle belongs. In this we have used various functions of MATLAB toolbox. All the experiments and simulations have been performed with MATLAB 2012.

REFERENCES

- [1]. Reetika Verma and Mrs. Rupinder kaur. "Enhanced Character Recognition Using SURF Features and Neural Network Technique". International Journal of Computer Science and Information Technologies, Vol. 5, pp. 5565-5570 (2014).
- [2]. ShradhaChadokar and Jijo S Nair. "A Survey on Offline Prompt Signature Recognition and Verification". International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 4, pp. 1432-1438 (2014).
- [3]. Neha Arora, Suricha Jain and Puran Gour. "Survey of Number Plate Recognition for Use in Different Countries using an Improved Segmentation. International Journal of Computer Applications. Vol. 102, No. 11, pp. 47-50(2014).
- [4]. Bhavin A Patel and Ashish Singhadia. "Review on Automatic Number Plate Recognition System Using Improved Segmentation Method". International Journal of Emerging Technology and Advanced Engineering. Vol. 4, Issue 9, pp. 752-756(2014).
- [5]. Abhay Chaturvedi and Nidhi Sethi. "Automatic Licence Plate Recognition System SURF Features and RBF Neural Network". International Journal of Computer Application, Vol. 70, pp. 37-41 (2013).
- [6]. Kauleshwar Prasad, devvrat C. Nigam, Ashmika Lakhotiya and Dheeren Umre. "Character Recognition Using Matlab's Neural Network Toolbox". International Journal of U- and e- service, Science and Technology. Vol. 6, pp. 13-20 (2013).

- [7]. Nisha Sharma, Tushar Patnaik and Bhupendra Kumar. "Recognition for Handwritten English Letters". International Journal of Engineering and Innovative Technology (IJEIT). Vol. 2, Issue 7, pp. 318-321(2013).
- [8]. Bharat Bhushan, Simranjot Singh and Ruchi Singla. "License Plate Recognition System using Neural Networks and Multithresholding Technique". International Journal of Computer Applications. Vol. 84, No. 5, pp. 45-50(2013).
- [9]. Suryakant and Neetu Kushwaha. "Edge Detection using Fuzzy Logic in Matlab". International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 2, Issue 4, pp. 38-40(2012).
- [10]. Gaganjot Kaur and Monika Aggarwal. "Artificial Intelligence System for Character Recognition using Levenbarg-Marquardt Algorithm". International Journal of Advanced Research in Computer Science and Software Engineering. Vol. 2, Issue 5, pp. 220-222(2012).
- [11]. Lekhana G.C and R.Srikantaswamy. "REAL Time License Plate Recognition System". International Journal of Advanced Technology & Engineering Research (IJATER) and National Conference on Emerging Trends in Technology (NCET-Tech). Vol. 2, Issue 4, pp. 5-9(2012).
- [12]. Md. Alamgir Badsha, Md. Akkas Ali, Dr. Kaushik Deb and Md. Nuruzzaman Bhuiyan. "Handwritten Bangla Character Recognition Using Neural Network". International Journal of Advanced Research in Computer Science and Software Engineering. Vol. 2, Issue 11, pp. 307-312(2012).
- [13]. Song Qing-Kun et al. "License plate recognition based on mathematical morphology method and RBF neural network". International Conference on Measurement, Information and Control (MIC). Vol. 2, pp. 782-786(2012).
- [14]. Ankush Roy and Debarshi Patanjali Ghoshal. "Number Plate Recognition for use in different countries using an improved segmentation". National Conference on Emerging Trends and Applications in Computer Science (NCETACS). Pp. 1-5(2011).
- [15]. Upadhyay P. , Barman, S. ; Bhattacharyya, D. and Dixit, M. "Enhanced Bangla Character Recognition Using ANN". International Conference on Communication Systems and Network Technologies (CSNT). Pp.194-197(2011).
- [16]. Zhiwen WANG and Shaozi Li. "Research and Implement for Vehicle License Plate Recognition Based on improved BP Network". International Conference on Computer and Communication Technologies in Agriculture Engineering (CCTAE). Vol. 3, pp. 101-104(2010).
- [17]. Sz.Pletl and cs.Galfi. "Parking surveillance and number plate recognition application". International Symposium on Intelligent Systems and Informatics (SISY). Pp. 253-256(2010).
- [18]. Bih-Yaw Shih, Chen-Yuan Chen and Jin-Wei Kuo Po-Wei Chen. "A Preliminary Study on Design and Development of Template-Based for License Plate Recognition System Applying Artificial Coordinates Auxiliary Techniques". International Conference on Industrial Engineering and Engineering Management (IEEM). Pp. 80-83(2010).