

A Review On Enhancement of Number Plate Recognition Based on Artificial Neural Network

Apurva Biswas
M.Tech, Department of CSE
TIT,Bhopal, India
biswas28apurva@gmail.com

Dr.Bhupesh Gaur
Professor & Head
Department of CSE
TIT,Bhopal, India

ABSTRACT

Due to the diversity of number plate, the process of recognition faced a problem. For the improvement of number plate recognition various authors used neural network model such as RBF neural network model, BP neural network model and SOM neural network model. In this paper present the review of number plate recognition based on different neural network model. The processing of number plate recognition is also very difficult due to background and noise. Due to the problem of recognition faced a problem of road security surveillance.

Keywords: - ANPR, Neural network, Image Processing.

INTRODUCTION

Automatic Number Plate Recognition (ANPR) is a powerful automated system which can have immense applications in our today's modern world where a number of vehicles are increasing exponentially day by day and to control such immense traffic effectively this system can be of utmost importance. ANPR can perform vehicle surveillance by scrutinizing vehicle theft, automation at toll booths, parking management and many others [4]. This paper will explore and elaborate the proposed algorithm for ANPR. Automated license plate recognition has many applications. It can facilitate access to secure premises and improve security by detecting unauthorized vehicles and alerting security personnel. Police cars fitted with a system for the detection and recognition of license plate can pull relevant history about a moving vehicle (e.g. repeated speed violations, expired registration, or the like). The input to the system is a digital image, taken by the high speed rotor cameras or digital cameras in our case, of a car and converted to gray scale using NTSC standard [6]. The illumination condition which is a main bottleneck is improved first by enhancing the image by finding the variance, and performs contrast stitching or equalization of the histogram. The image is

binarized using thresholding technique, and various morphological operations, have performed numerous times as per the requirement.

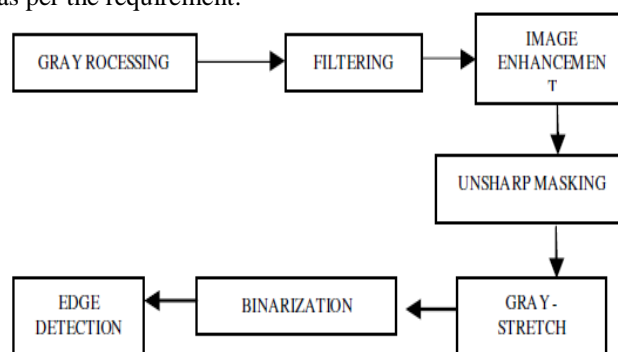


Figure 1: Step for Image Pre-Processing.

License Plate Detection and Recognition System is an image-processing technique used to identify a vehicle by its license plate. In fact, this system is one kind of automatic inspection of transport, traffic and security systems and is of considerable interest because of its potential applications to areas such as automatic toll collection, traffic law enforcement and security control of restricted areas. License plate location is an important stage in vehicle license plate recognition for automated transport system. Automatic License Plate Identification is an essential stage in intelligent traffic systems. Nowadays, vehicles play a vital role in transportation [13]. Also the use of vehicles has been increasing because of population growth and human needs in recent years. Therefore, control of vehicles is becoming a big problem and much more difficult to solve. Automatic vehicle identification systems are used for the purpose of effective control. Automatic License Plate Identification (ALPI) is a form of automatic vehicle identification. It is an image processing technology used to identify vehicles by

only their license plates [8]. Real time LPR plays a major role in automatic monitoring of traffic rules and maintaining law enforcement on public roads. Since every vehicle carries a unique license plate, no external cards, tags or transmitters need to be recognizable, only license plate.

PLATE LOCALISATION

This process of plate localization includes rough license plate localization. We find the rough location first to find the approximate location of the license plate and this will include many irrelevant details like car bonnet or any Govt. Approved texts. The reason for finding the rough approximate location is cited in later discussion inaccurate plate localization [5]. The localization of license plates using edge finding algorithms is another approach used mainly in object detection in edge maps of images. The edge based methods pertaining to plate localization are based on the principle that the plates appearing in the image of the vehicle have some distinct features that make it distinguishable easily from the rest of the image such as high contrast of the license plate as compared to the rest of the image of the vehicle [14].

Plate features: the color of the plate was used as a feature, the image was fed to a colour filter, and the output was tested in terms of whether the candidate area had the plate's shape or not. Wang et al. Used a special filter instead of a clear filter. The filter was convolved with the gray image, as the output would be the character-shaped objects, and the candidate regions were scanned to verify the nominated region. In, a threshold-based method was used [17]. All the color-based algorithms suffer from the illumination condition, because colors can be seen differently under different illuminations, also, plates have various colors and sizes. A threshold based method will accordingly not guarantee that the plate region will be among the candidate regions.

EDGE DETECTION

Edges as a reference point for extracting the plate. The pixels' intensities of characters and plate edges are completely different from the intensities in the neighboring pixels, because they always come in different colors. The edges in an image can be detected by the gradient process (derivative) [11]. The second step of edge detection algorithms is to locate the edges of the plates from the black and white image. The mathematical morphologies on the edges of the image, which included dilating, closing and erosion with the addition of the connected component analysis to extract the plate.



Figure 2: (a) Original image (b) black and white image format.

The rest of this paper is organized as follows. In Section II describe about the literature review in the field of number plate recognition, and in The Section III shows the problem statement and states the problem in brief and finally section IV discusses conclusion and future work.

II RELATED WORK

This section gives an extensive literature survey on the License plate recognition systems have established a lot of interest from the research community. Much research has been done on Chinese, Dutch, Indian and English license plates. A characteristic feature of research work in this area is being limited to a specific region, city, or country. This is due to the lack of equivalence among different license plates. This section gives an overview of the research carried out so far in this area and the techniques employed in developing an LPR system.

Sahil Shaikh, Bornika Lahiri, Gopi Bhatt, Nirav Raja [1] In this paper, author used the innovative method is proposed for number plate recognition. It uses series of image manipulations to recognize number plates. It uses 4-6 algorithms in order to do the same. For plate localization, several traditional images processing techniques are used. Techniques such as image enhancement, un sharp masking, edge detection, filtering and component analysis each plays a role in the extraction process. For character segmentation,



connected components are extracted as individual number plate characters. Template Matching is in charge of the Optical Character Recognition.

Mohammad Ghazal, Hassan Hajjdiab [2] In this paper, authors propose a method for automatic license plate detection and recognition in the city of Abu Dhabi. The proposed method starts by segmenting moving vehicles using background subtraction. Segmented vehicles are tracked using a color-based particle-filtering technique until the vehicle is in position for a high resolution image to be taken by a still camera. The license plate is detected by converting the image into the LAB color space and using level set methods to locate its contour. Regularity and size are used to filter erroneous blobs.

Anurag Tyagi, Rakesh Rathi, Vinesh Jain, Abhishek Tyagi [3] In this paper author discuss different types of localization algorithms and which of them should be used for a particular application. Different countries have their own types of license plates for instance some use single line horizontal license plates while others use multi line non horizontal and differently located number plates.

Wei Wu, Zheng Liu, Mo Chen, Xiaomin Yang, Xiaohai He [4] In this paper author proposes a text-line region location algorithm, which takes into account the characteristics of single character as well as the spatial relationship between successive characters. This module locates the text-line regions by using a horizontal high-pass filter and scan line analysis. To resolve non uniform illumination, a two step procedure is applied to segment container-code characters, and a projection process is adopted to isolate characters in the isolation module.

Ankush Roy, Debarshi Patanjali Ghoshal [5] In this paper author tries to address this problem of ANPR by using a pixel based segmentation algorithm of the alphanumeric characters in the license plate. The non-adherence of the system to any particular country-specific standard & fonts effectively means that this system can be used in many different countries a feature which can be especially useful for trans-border traffic e.g. use in country borders etc. Additionally, there is an option available to the end-user for retraining the Artificial Neural Network (ANN) by building a new sample font database. This can improve the system performance and make the system more efficient by taking relevant samples.

S. Hamidreza Kasaei, S. Mohammadreza Kasaei, S. Alireza Kasaei [6] In This paper author presents a real time and robust method of license plate detection and recognition based on the morphology and template matching. In this system main stage is the isolation of the license plate, from the digital image of the car obtained by a digital camera under different circumstances such as illumination, slop,

distance, and angle. The algorithm starts with preprocessing and signal conditioning. Next license plate is localized using morphological operators. Then a template matching scheme will be used to recognize the digits and characters within the plate.

Kumar Parasuraman, P.Vasanth Kumar [7] In this paper author discusses a novel method for vehicle license plate extraction and character segmentation, and the details are a smart, simple and efficient algorithm which is mainly designed for Indian license Plate Recognition is presented for vehicle's license plate recognition system. The proposed algorithm consists of three major parts: Extraction of plate region, segmentation of characters and recognition of plate characters. For extracting the Plate region, edge detection algorithm and vertical projection method are used

Nicolas Thome, Antoine Vacavant, Lionel Robinault, Serge Miguet [10] In this paper, author proposes an approach that can deal with various national plates. There are three main areas of novelty. First, the Optical Character Recognition (OCR) is managed by a hybrid strategy, combining statistical and structural algorithms. Secondly, an efficient probabilistic edit distance is proposed for providing an explicit video-based LPR. Last but not least, cognitive loops are introduced at critical stages of the algorithm. These feedback steps take advantage of the context modeling to increase the overall system performances, and overcome the inextricable parameter settings of the low-level processing.

III PROBLEM STATEMENT

We studied various research paper in related to the number plate recognition. But we have not found much research paper in journal related to Indian license number plate because the Indian number plates are versatile (there is no any particular standard format for number plate). But in current scenario Govt. of India issues standard number plate and standard templates of characters and number's. In order to maintain traffic problem and controlling a crime and various agencies working in the field of Indian license plate recognition system. We found some general problem. Here we mention problem with references:

- Rate of recognition low [11].
- Creation of template [2, 3, 7].
- Recognition time is very high [17].
- Standard deviation error of most of the method nearer 5 to 10%.

IV CONCLUSION AND FUTURE WORK

In this paper prents the review of number plate recognition system. Now a days various method are used for the recognition and feature extraction of number plate. The number plate recognition basically faced a problem of

standard size of number and alphabet. Some size of alphabet is 20*40 and some other are used some other alphabet. Some authors are used neural network model and some authors are used classification and optimization technique for better recognition and better localization. In the process of review finds some problem such as rate of recognition and creation of template for generation of pattern. In future used back propagation neural network for better recognition of number plate.

REFERENCES

- [1] Sahil Shaikh, Bornika Lahiri, Gopi Bhatt, Nirav Raja "A novel approach for Automatic Number Plate Recognition" International Conference on Intelligent Systems and Signal Processing, 2013. Pp 375-381.
- [2] Mohammad Ghazal, Hassan Hajjdiab "License Plate Automatic Detection and Recognition Using Level Sets and Neural Networks" IEEE 2013. Pp 1-5.
- [3] Anurag Tyagi, Rakesh Rathi, Vinesh Jain, Abhishek Tyagi "Performance Analysis of Localization Algorithms Applied on Real Time License Plates of Different Countries" IEEE 2013. Pp 14-19.
- [4] Wei Wu, Zheng Liu, Mo Chen, Xiaomin Yang, Xiaohai He "An automated vision system for container-code recognition" Expert Systems with Applications, Elsevier 2012. Pp 2842-2855.
- [5] Ankush Roy, Debarshi Patanjali Ghoshal "Number Plate Recognition for Use in Different Countries Using an Improved Segmentation" IEEE 2011. Pp 1-5.
- [6] S. Hamidreza Kasaei, S. Mohammadreza Kasaei, S. Alireza Kasaei "New Morphology-Based Method for Robust Iranian Car Plate Detection and Recognition" International Journal of Computer Theory and Engineering, Vol- 2, 2010. Pp 264-269.
- [7] Kumar Parasuraman, P.Vasanth Kumar "An Efficient Method for Indian Vehicle License Plate Extraction and Character Segmentation" International Conference on Computational Intelligence and Computing Research, IEEE 2010. Pp 1-4.
- [8] C. Shan, T. Tan, Y. Wei "Real-time hand tracking using a mean shift embedded particle filter" Pattern Recognition, vol. 40, 2009. Pp. 1958-1970.
- [9] Rami Al-Hmouz, Subhash Challa "License plate localization based on a probabilistic model" Machine Vision and Applications, 2010. Pp 319-330.
- [10] Nicolas Thome , Antoine Vacavant ,Lionel Robinault , Serge Miguet "A cognitive and video-based approach for multinational License Plate Recognition" Machine Vision and Applications, 2010. Pp 1-19.
- [11] Yo-Ping Huang, Chien-Hung Chen, Yueh-Tsun Chang , Frode Eika Sandnes "An intelligent strategy for checking the annual inspection status of motorcycles based on license plate recognition" Expert Systems with Applications, 2009. Pp 9260-9267.
- [12] Christos Nikolaos E. Anagnostopoulos, Ioannis E. Anagnostopoulos, Ioannis D. Psoroulas, Vassili Loumos, Eleftherios Kayafas "License Plate Recognition From Still Images and Video Sequences: A Survey" IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS,IEEE VOL- 9,2013. Pp 377-391.
- [13] M. M. Shidore, S. P. Narote "Number Plate Recognition for Indian Vehicles" International Journal of Computer Science and Network Security, VOL-11, 2011. Pp 143-146.
- [14] Z. Wang, X. Yang, Y. Xu, and S. Yu "Camshift guided particle filter for visual tracking" Pattern Recognition Letters, vol-30, 2009. Pp 407-413.
- [15] C. Shan, T. Tan, and Y. Wei "Real-time hand tracking using a mean shift embedded particle filter" Pattern Recognition, vol.- 40, 2009. Pp 1958-1970.
- [16] Balazs Enyedi, Lajos Konyha and Kalman Fazekas "Real Time Number Plate Localization Algorithms" in Journal of Electrical Engineering, Vol-57, 2006. Pp 69-77.
- [17] N. Stamatopoulos, B. Gatos, A. Kesidis "Automatic Borders Detection of Camera Document Images" 2007. Pp 71-78.
- [18] E. Atkoci unas, R. Blake, A. Juozapavicius, M. Kazimianec "Image Processing in Road Traffic Analysis Non- linear Analysis: Modelling and control"2005, Vol- 1, 2008. Pp 1-6.
- [19] Z. Wang, X. Yang, Y. Xu, S. Yu "Camshift guided particle filter for visual tracking" Pattern Recognition Letters, vol-9, 2009. Pp. 407-413.