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EFFICIENT LICENSE PLATE RECOGNITION USING DYNAMIC THRESHOLDING AND GENETIC ALGORITHMS

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***Abstract*— In this paper planned technique depends on identifying the key characteristic of a number plate the concentration of characters with robust light-on-dark edges. The system that reads number plates from any digital image, color or monochrome, sizes vary from 640×480 to megapixel pictures there are 3 major steps to number plate reading. Locating and isolating the number plates within the image, Locating and isolating the characters within the number plate, Reading the characters (OCR, optical character recognition).A style of a new genetic algorithm (GA) is introduced to watch the locations of the license plate (LP) symbols. An adaptive threshold methodology has been applied to beat the dynamic changes of illumination conditions once converting the image into binary. Open ALPR (Automated license plate Recognition) is used to observe candidate objects within the image.**

Keywords*— *Genetic algorithms, image processing, image representations, license plate detection, Machine vision, road vehicle identification

I. INTRODUCTION

License Plate Recognition (LPR) plays a vital role in varied applications like unattended parking lots [1], security control of restricted areas [5], and traffic safety social control [8], [9]. This task is sort of difficult because of the diversity of plate formats and also the non-uniform outdoor illumination conditions throughout image acquisition, like backgrounds [2], [10], illumination vehicle speeds and distance ranges between the camera and also the vehicle. Therefore, most approaches work only under restricted conditions like fixed illumination, limited vehicle speed, designated routes, and stationary backgrounds.

The detection stage of the LP is that the most crucial step in an automatic vehicle identification system .A various analysis has been carried out to overcome several issues faced during this area however there's no general methodology that will be used for detection license plates in different places or countries, due to the difference in plate style or design. A style of a new genetic algorithmic rule (GA) is introduced to observe the locations of the license plate (LP) symbols. An adaptive threshold methodology has been applied to overcome the dynamic changes of illumination conditions once converting the image into binary. Open ALPR (Automated License Plate Recognition) is used to detect candidate objects inside the image. This method relies on identifying the key characteristic of a number plate the concentration of characters with strong light-on-dark edges. The system which reads number plates from any digital image, color or monochrome, sizes range from 640×480 to megapixel images there are three major steps to number plate reading. Locating and isolating the number plates in the image, Locating and isolating the characters in the number plate, Reading the characters (OCR, optical character recognition).

All the developed techniques are categorized according to the selected choices upon that the detection algorithm was based mostly and additionally the type of the detection formula itself. Color-based systems are designed to observe specific plates having fixed colors. External-shape based techniques were developed to observe the plate based on its rectangular kind. Edge-based techniques were in addition implemented to observe the plate supported the high density of vertical edges inside it. Analysis in and were supported the intensity distribution within the plate's area with regard to its neighborhood where the plate is considered as Maximally Stable External Region (MSER). The applied detection algorithms ranged from window-based applied mathematics matching ways to highly intelligent-based techniques that used neural networks or fuzzy logic. GAs has been used rarely due to their high computational needs. In GA was wont to search for the simplest fixed rectangular area having a similar texture options as that of the prototype template. In GA was wont to find the plate vertically once detection the left and right limits based on horizontal symmetry of the vertical texture histogram round the plate's area. GA was utilized in to recognize the LP symbols to not detect the LP. Another cluster of

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researchers tried to control the matter from the texture perspective to differentiate between text and different image sorts.

A typical system for LPR consists of 4 elements, i.e., obtaining a picture of the vehicle, license plate localization and segmentation, character segmentation and standardization, and character recognition. The performance of the locating operation is crucial for the complete system, because it directly influences the accuracy and efficiency of the subsequent steps. However, it's additionally a difficult obstacle to overcome due to totally different illumination conditions and numerous complicated backgrounds. during this project projected several ways of locating the license plates, like the edge detection methodology line sensitive filters to extract the plate areas, the window methodology and also the mathematics morphology methodology. although these algorithms will method the license plates location, they possess formidable disadvantages like sensitivity to brightness, longer processing time, and lack of versatility in adapting to the variable environment.

II. License Plate Detection

First, Mobile As way as extraction of the plate region is concerned, techniques primarily based upon combinations of edge statistics and mathematical morphology [3]–[6] featured excellent results. In these ways, gradient magnitude and their local variance in a picture are computed. They're based on the property that the brightness modification within the license plate region is additional remarkable and additional frequent than otherwise. Block-based processing is additionally supported [7]. Then, regions with a high edge magnitude and high edge variance are known as possible license plate regions. Since this technique doesn't depend upon the edge of vehicle plate boundary, it may be applied to a picture with unclear license plate boundary and may be implemented simply and quick. a drawback is that edge-based ways alone will hardly be applied to complicated pictures, since they're too sensitive to unwanted edges, which can additionally show high edge magnitude or variance (e.g., the radiator region within the front read of the vehicle). In spite of this, once combined with morphological steps that eliminate unwanted edges within the processed pictures, the license plate extraction rate is relatively high and fast compared to different ways.

Color or gray-scale-based process ways are planned within the literature for license plate location [8]–[12]. Crucial to the success of the colour (or gray level)-based technique is that the color (gray level) segmentation stage. On the other hand, solutions presently available don't give a high degree of accuracy during a natural scene as color isn't stable once the lighting conditions modification. Since these ways are usually color based, they fail at detection numerous license plates with varied colours. Although color process shows higher performance, it still has difficulties recognizing a car image if the image has several similar components of color values to a plate region. AN increased color texture based mostly technique for detection license plates (LPs) in pictures was given in [13]. The system analyzes the colour and textural properties of LPs in pictures using a support vector machine (SVM) and locates their bounding boxes by applying a continuous adaptive mean shift (CAMShift) rule. The combination of CAMShift and SVMs made efficient LP detection as long color texture analysis for less relevant pixels were restricted, leaving only a small a part of the input image to be analyzed. Yet, the planned technique still encountered issues once the image was very blurred or quite complex in color. AN example of long texture analysis is given in [14], wherever a combination of a "kd-tree" data structure and an "approximate nearest neighbor" was adopted. The procedure resource demand of this segmentation technique was the most disadvantages, since it yielded an execution time unacceptable for LPR (34 s).

The purpose of this study is to explore the efficiency of a new technique of Optical Character Recognition (OCR) for car registration plate recognition by the application of the Hough transform for the registration plate characters identification. The process will produce an identification array for every character by using the Hough transform, and then this identification array will be used in this project to recognize the plate characters.

III. Proposed Method

In the Proposed algorithm to be developed will locate strong edges which are spaced proportionally given the expected size of the plate relative to the overall image. A strong edge is defined as a vertical line where adjacent pixels have high luminance deltas, relative to other areas of the scene. Using which the accuracy of license plate detection will be high analysis. This technique has the advantage of analyzing texture in an unlimited number of directions and scales. A method for license plate location based on the Gabor transform is presented. The results were encouraging once applied to digital pictures acquired strictly during a fixed and specific angle, however the strategy is computationally expensive and slow for pictures with large analysis.

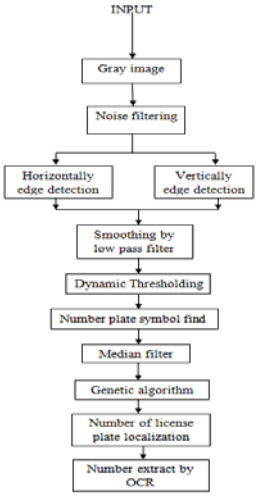

Fig.1 Flowchart showing Proposed System

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In this proposed system the firstly we take input in colour image then convert to gray image. After that noise removing process in image by noise filtering method. Then we detect the edges horizontally and vertically by edge detection technique. Then we are smoothing the image by low pass filter. After that dynamic thresholding process are done. Then find the number plate symbol and median filter, genetic algorithm process are done. Then we are localization process on number license plate. The optical character reorganization process extracts the number that is output of proposed system.

A. *Geometric Operation*

Geometric operation may be a method to find the car registration number plate. The aim of this operation is to localize the car plate for faster character identification over a small region. An improved Back Propagation network is used to overcome the weakness of convergence speed in [1]. Genetic algorithmic rule and momentum term is introduced to this network to increase the speed of convergence rate. this BP network learning method is said to be simply produce error if initial weights isn't set properly and it's difficult to determine the amount of hidden layer and hidden nodes. The improved network using BP momentum increase the speed and also the accuracy to localize the car license place location. A grayscale image extracts the edge of the license plate using Sobel operator. The input of the experiment is shown as Fig.2 whereas the example output will be viewed as shown in Fig.2.

Fig.2 Input data for License Plate Image Processing

B. *Architecture of OCR*

Since hp had independently-developed page layout analysis technology that was used in products, (and thus not free for open-source) Tesseract never required its own page layout analysis. Tesseract thus assumes that its input could be a binary image with optional polygonal text regions defined. Process follows a traditional step-by-step pipeline, however a number of the stages were unusual in their day, and possibly remain thus even currently. The primary step could be a connected element analysis during which outlines of the elements are stored. This was a computationally expensive style decision at the time, however had a major advantage: by inspection of the nesting of outlines, and also the variety of child and grandchild outlines, it's easy to observe inverse text and acknowledge it as simply as black-on-white text. Tesseract was most likely the primary OCR engine able to handle white-on-black text thus trivially. At this stage, outlines are gathered along, purely by nesting, into Blobs. Blobs are organized into text lines, and also the lines and regions are analyzed for fixed pitch or proportional text.

C. *Character Recognition*

The Character recognition is the most necessary task in recognizing the plate number. The recognition of characters has been a problem that has received a lot of attention within the fields of image process, pattern recognition and AI. It's as a result of there's lots of possibility that the character made from the normalization step differ from the information. A similar character might differ in sizes, form and style that would lead to recognition of false character, and affect the effectiveness and increase the complexity of the complete system.

D. *Digitization*

The Digitization of an image is converting the individual character into binary matrix based on the specified dimensions. This process can ensure the uniformity of dimensions between the input and stored patterns within the database, the alphabet A has been digitized into 24x15=360 binary matrix, every having either black or white color pixel. It is necessary to convert the information into meaningful data. A binary image function will then be assign for every black pixel, the value is zero (background) and for every white pixel, the value is one (foreground) as shown in Fig.3. There are a number of strategies applied for the recognition of characters like example matching, feature extraction, geometric approach, neural network, support vector machine, Hidden Markov Model and Bayes internet.

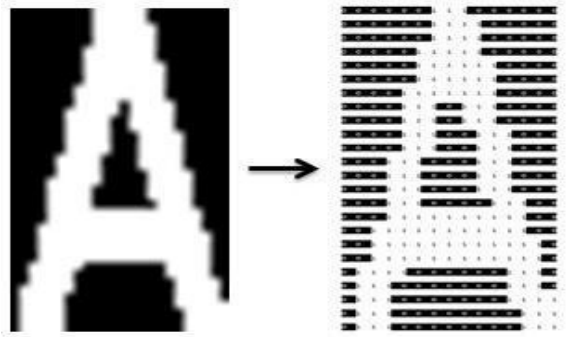

Fig.3 Image Digitization

E. *Character Segmentation*

The license plate candidates determined in the previous stage are examined in the license number identification phase. There are two major tasks involved in the identification phase: character segmentation and character recognition. A number of techniques to segment each character after localizing the plate in the image have also been developed, such as feature vector extraction and mathematical morphology, and Markov random fields (MRFs). The work in proposed a novel adaptive approach for character segmentation and feature vector extraction

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from seriously degraded images. Basically, this approach can detect fragmented, overlapping, or connected characters and adaptively apply one of three algorithms without manual fine tuning.

IV. Result

In this paper proposed genetic algorithm used for efficient license plate recognition. The proposed system has been implemented using MATLAB.

Fig.4 Main image

This fig 4 is input image. We take input colour image that is main image.

Fig.5 Gray image

This fig.5 the gray image, we are converting the colour image into gray image.

Fig.6 Dilated image

This fig.6 is the noise removing image. That is detailed image.

Fig.7 Gray image

This fig.7 is the noise removing gray image.

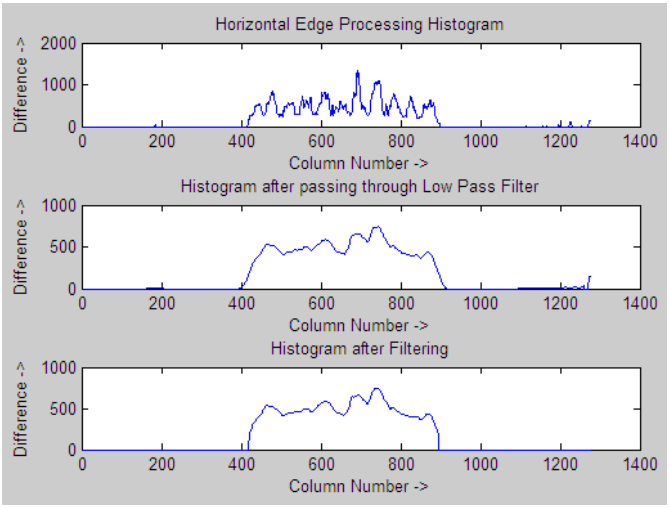

Fig.8 Horizontal edge processing histogram

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This fig 8 is horizontally edge detection output after filtering by lo pass filter then we get the output edge processing histogram.

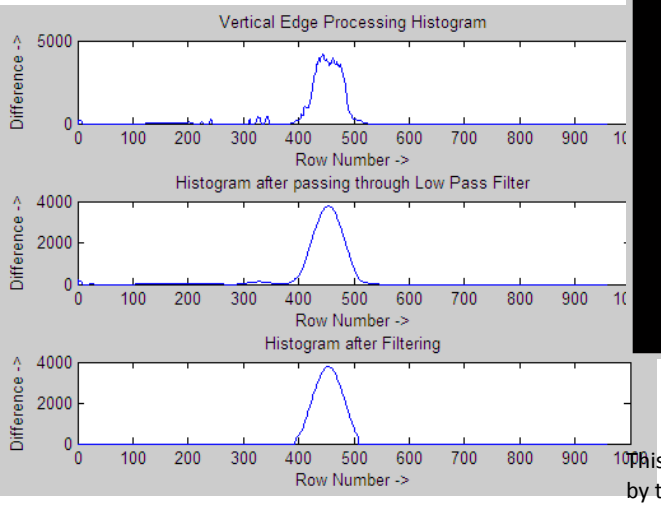

Fig.9 Vertical edge processing histogram

This fig 9 is vertically edge detection output after filtering by lo pass filter then we get the output edge processing histogram.

Fig.10 Histogram image after filtering

This fig.10 shows the output of object sizing filter. Filtering process and detect the size of image then we get the histogram image.

Fig.11 Output image

This fig.11 shows output image that is extracted number by the optical character reorganization.

V. CONCLUSION

In this paper a new genetic based prototype system for localizing 2-D compound objects inside plane images has been introduced and tested in the localization of LP symbols. The results were encouraging and a new approach for solving the LP detection problem relying only on the geometrical layout of the LP symbols has been experimentally proved. Also, a flexible system has been introduced that can be simply adapted for any LP layout by constructing its GRM (Genetic Relationship Matrix). The system proved to be invariant to object distance (scaling), insensitive with respect to perspective distortion within a reasonable angle interval, and immutable to a large extent to the presence of other types of images in the vehicle background.

REFERENCES

[1] G. Abo samra, f. Khalefah “localization of license plate number using dynamic image processing techniques and genetic algorithms” IEEE tran. On evol. Computing vol. 18 no. 2 pp. 1-14 2014.

[2] Du, Shan, et al. "Automatic license plate recognition (ALPR): A state-of-the-art review." IEEE Transactions on Circuits and Systems for Video Technology 23.2 (2013): 311-325.

[3] Chuang, Chi-Hung, et al. "Vehicle licence plate recognition using super-resolution technique." Advanced Video and Signal Based Surveillance (AVSS), 2014 11th IEEE International Conference on. IEEE, 2014.

[4] Ktata, Sami, and Faouzi Benzarti. "License plate detection using mathematical morphology." Sciences of Electronics, Technologies of Information and

Telecommunications (SETIT), 2012 6th International Conference on. IEEE, 2012.

[5] Giannoukos, Ioannis, et al. "Operator context scanning to support high segmentation rates for real time license plate recognition." Pattern Recognition 43.11 (2010): 3866-3878.

[6] Halina Kwaśnicka and Bartosz Wawrzyniak "License plate localization and recognitionin camera pictures", Gliwice, Poland November 13-15, 2002.

[7] M. Deriche, "GCC License Plates Detection and Recognition Using Morphological Filtering and Neural Networks" Int J. on Comp. Sci. and Info Security, IJCSIS, vol. 8, No. 8, pp. 263-269, Dec, 2010.

[8] O. Villegas, D. Balderrama, H. Domínguez and V. Sánchez, "License Plate Recognition Using a Novel Fuzzy Multilayer Neural Network" International Journal of Computers", Issue 1,vol. 3, 2009.

[9] S.H. Mohades Kasaei, S.M. Mohades Kasaei and S.A. Monadjemi, "A Novel Morphological Method for Detection and Recognition of Vehicle License Plate" American Journal of Applied Science, vol.6 no.12, pp. 2066-2070, 2009.

[10] A. Theja, S. Jain, A. Aggarwal and V. Kandanvli, "License Plate Extraction Using Adaptive Threshold and Line Grouping" International Conference on Signal Processing Systems (ICSPS), vol.1, no., pp. 211-214, 5-7 July 2010.

[11] W. Wang, Q. Jiang, X. Zhou, and W. Wan, "Car License Plate Detection Based on MSER," In Proc. International Conference on Consumer Electronics, Communications and Networks, pp. 3973-3976, 2011.

[12] [12] H. W. Lim and Y. H. Tay, "Detection of License Plate Characters in Natural Scene with MSER and SIFT Unigram Classifier" In Proc. IEEE Conference on Sustainable Utilization and Development in Engineering and Technology, pp. 95-98, 2010.

[13] H. Anoual, S. Fkihi, A. Jilbab, and D. Aboutajdine, "Vehicle License Plate Detection in Images" International Conference on Multimedia Computing and Systems, pp. 1-5, 2011.

[14] X., Zhang, and S. Zhang, "A Robust License Plate Detection Algorithm Based on Multi-Features" International Conference on Computer and Automation Engineering, vol. 5, pp. 598-602, 2010.

[15] D., Zheng, Y. Zhao and J. Wang, "An Efficient Method of License Plate Location" Pattern Recognition Letters, vol. 26 no.15, pp. 2431-2438, 2005.

[16] [16] J. Xu, S. Li, and M. Yu, "Car License Plate Extraction Using Color and Edge Information" Machine Learning and Cybernetics, 2004, vol. 6, pp. 3904-3907.

[17] S. Z. Wang and H. M. Lee, "Detection and Recognition of License Plate Characters With Different Appearances" Proc. Conf. Intell. Transp. Syst., vol. 2, pp.979 -984, 2003.

[18] L. Carrera, M. Mora, J. Gonzalez and F. Aravena, "License Plate Detection Using Neural Networks," In Proceedings of IWANN vol.2, pp. 1248-1255, 2009.

[19] M. I. Chacon and A. Zimmerman, "License Plate Location Based on a Dynamic PCNN Scheme" Proc. Int. Joint Conf. Neural Netw., vol. 2, pp.1195 -1200, 2003.

[20] S.-L. Chang, L.-S. Chen, Y.-C. Chung, and S.-W. Chen, "Automatic License Plate Recognition" IEEE Trans. Intell. Transp. Syst., vol. 5, no. 1, pp. 42 -53, 2004.