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License Plate Recognition Using Canny Edge Detection

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ABSTRACT: Vehicle Plate Recognition is a successful image processing technique used to recognize vehicles number plates. The plates with different backgrounds make it more complicated to use the existing algorithms. Number plate recognition system is applicable to wide range of uses such as Border crossing vehicle, highway toll collection, traffic management, parking management at various locations and many more. The canny edge algorithm the detection process is divided into three steps are character recognition, character segmentation and template matching using MATLAB. By using this we can detect number plates correctly with minimum time duration.

KEYWORDS : LPR, Edge detection,BFS,Recognition, Segmentation,Extraction, Template matching.

I. INTRODUCTION

The main application of digital image processing is the Vehicle License Plate Recognition.Large integration of information and electronics technologies into all fields of day to day life caused demand for processing vehicles as related resources in information systems. Because a single information system without any data has no value, there was also a need to change information about vehicles between the reality and information systems. Traffic control and vehicle owner identification has become a major problem in every country. Sometimes it becomes difficult to identify the vehicle owner who violates traffic rules and drives too fast. Therefore it is not possible to catch and punish those kinds of people because the traffic personal might not be able to retrieve vehicle number from the moving vehicle because of the speed of the vehicle. The vehicle license recognition system commonly combines 3 sub-systems: license plate detection, which aims to locate the vehicle and its license plate; and license plate recognition, which aims to recognize the characters on the plate, segmentation and template matching, which aims to segment the recognized image or character and matched to the data base.

II. EXISTING SYSTEM

In Existing system deep learning method is used.deep learning is a machine learning method.It allows to train an AI to predict outputs, given a set of inputs.Deep learning can be classified into two types namely, supervised and unsupervised or semi supervised. Both supervised and unsupervised learning can be used to train AI. Deep learning is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called artificial neural networks.Deep learning method uses DFS(Depth First Search).Existing mrthod only recognizes the number plate.

III. CANNY EDGE DETECTION ALGORITHM

Edge-detection is a basic tool that is widely used within image processing.It is applied practically in applications such as object determination,in which feature detection aims to sharply identify certain objects of an image.Several edge-detection methods are widely used based on several optimization techniques.for example,error minimization,maximizing an object function,fuzzy logic,wavelet approach,morphology,genetic algorithms,neural

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network and Bayesian approach.Various edge detection methods perform to wavering degrees of quality within altered conditions.Therfore,it is possible to apply multiple edge detection algorithms.The canny edge detector is an operator which uses a multi stage algorithm to determine a wide range of edges in a noisy image.

It was developed by John F. Canny; canny operator was used to detect wide range of edges in an image with the help of a multi stage algorithm. In order to meet the criterions of capturing edges with a minimum error rate, detected edge point should be accurately localized at the center of the edge by the operator and an edge should be marked only once whilst preventing false edges being created. The Canny edge detector is classified as a Gaussian edge detector. This is because the filter is approximated by first-order derivatives of Gaussians. Firstly, the image is smoothed to eliminate any noise; it then finds the image gradients to emphasize regions with high spatial derivatives. These regions are tracked and any pixel within the region that is not at the maximum is suppressed. At this point hysteresis is introduced to track along the rest of the pixels that have not been suppressed. Two thresholds are set for hysteresis, which are compared to the gradient magnitude to find edge and non edge. The first and most obvious is low error rate. It is important that edges occurring in images should not be missed and that there be no responses to non-edges. The second criterion is that the edge points be well localized. In other words, the distance between the edge pixels as found by the detector and the actual edge is to be at a minimum. A third criterion is to have only one response to a single edge. This was implemented because the first two were not substantial enough to completely eliminate the possibility of multiple responses to an edge.

IV. BREADTH FIRST SEARCH

Breadth-first search(BFS) ia an algorithm for traversing or searching tree or graph data structures.It uses the opposite strategy as depth-first search,which instead explores the highest-depth nodes first before being forced to backtrack and expand shallower nodes.

FLOWCHART FOR LICENSE PLATE RECOGNITION

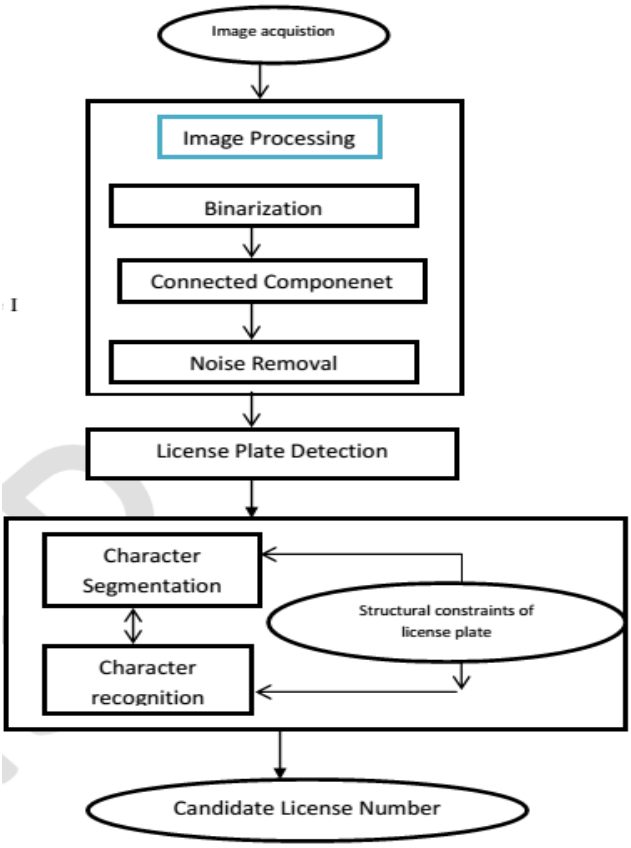

Figure 1 flowchart of license plate recognition

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V. OPERATIONS OF CANNY EDGE DETECTION

The edge detection method proposed by Canny is based on the image gradient computation but in addition tries to:

- Maximize the signal-to-noise ratio for a proper detection.
- Find a good localization of the edge points,
- Minimize the number of positive responses around a single edge(suppression of gradient module non-maximum).

The steps of the Canny edge detection method are given below:
1.Noise filtering through a gaussian kernel
2.computing the gradient's module and direction
3.non-maximum suppression of the gradient's module
4.edge linking through adaptive hysteresis thresholding

Noise filtering through a Gaussian kernel

The noise in the image is high frequency information which overlaps the original image signal.This introduces false edge points.The noise intrinsic to the image acquisition process can be modeled by a Gaussian distribution and can be suppressed by a Gaussian filter.

Computing the gradient's magnitude and direction

Computing the gradient's module and direction requires the allocation of two temporary image buffers(with the same size as the image) and the initialization of their elements.

Non-maxima suppression of the gradient's module

Its purpose is the thinning of the edges by retaining only the edge points with the highest gradient module along the direction of the image intensity variation(along the direction of the gradient vector).

Edge linking through adaptive hysteresis thresholding

After computing the image gradient and performing the non-maxima suppression procedure,an "image" is obtained in which the pixel values are equal with the gradient;s modules in that pixel.Moreover ,the thickness of the edge pixels(with non-zero module)has an ideal value of one pixel.

VI. PROPOSED SYSTEM

The proposed work presents the automatic vehicle number plate identification system using vehicle number plate. The system was implemented in Matlab and its performance was tested on real images. A number plate recognition system is one kind of an Intelligent Transport System. Also the template matching algorithm has been used to extract the vehicle number plate. The automatic vehicle number plate identification system plays an important role in detecting security threat. Here, character segmentation for separating individual characters. Finally, match with template using template match algorithm and extract the number plate in notepad.

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VII. BLOCK DIAGRAM

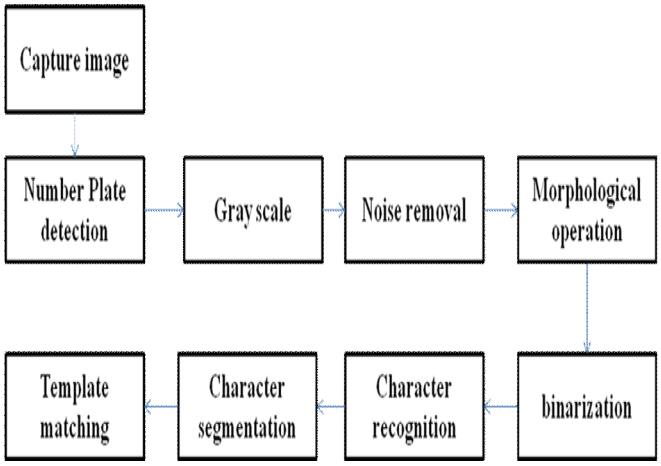

Figure 2 Block Diagram

7.1 BLOCK DIAGRAM EXPLANATION

- Read the input image
- Convert the colored image into gray scale.
- Remove noise by using median filter.
- Convert the image into binary image.
- To detect the edges by hysteresis.
- Extract the characters from the number plate.
- Template matching.

VIII. SIMULATION RESULT

We examined a image containing vehicle with number plate.This image can be processed and further result can be obtained.Extract the number plate from the input image and load the number plate.first step is converted into gray scale image,second step is noise removal using median filter,third step is image dilation and erosion operation,again the image into binary format,finally extracted number plate can be obtained.After that template matching can be processed.template matching is defined as the extracted image or character can be matched with the data base image or charater.

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Figure 3 Example vehicle number plate

Figure 4 Extracted number plate

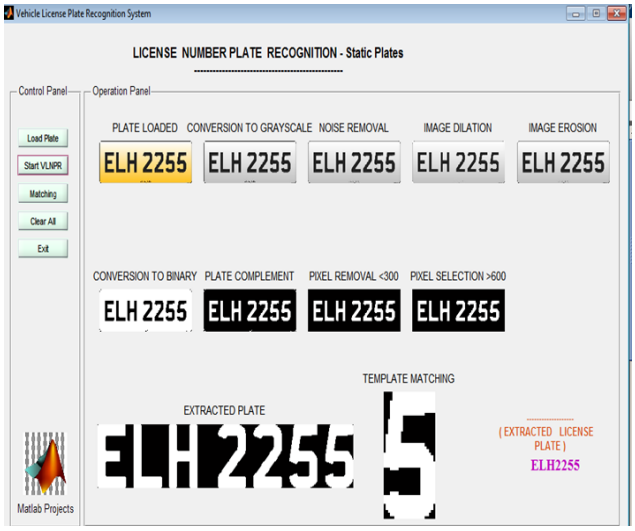

Figure 5 Output of canny edge detection

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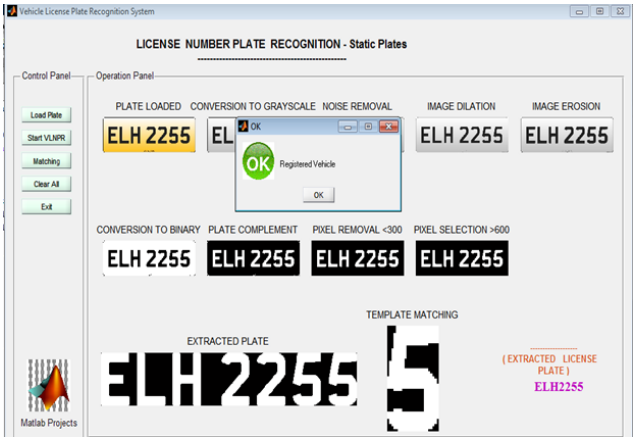

Figure 6 Template matching

IX. CONCLUSION

Since edge detection is the initial step in object recognition, it is important to know the differences between edge detection techniques. The software is developed using MATLAB. The performance of the Canny algorithm depends heavily on the adjustable parameters which is the standard deviation for the Gaussian filter, and the threshold values which also controls the size of the Gaussian filter. The larger the scale of the Gaussian, the less accurate is the edge detection. however, the Canny's edge detection algorithm performs better and License plate detection was achieved successfully. Canny edge detection is having more accuracy compared to sobel edge detection. Sobel edge detection has less CPU time compared to canny edge detection.

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