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The Real Time Vechicle License Plate Identification System

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Abstract— In this paper "The Real time vehicle license plate identification system"(RTVLPIS) is developed. This approach is based on region-props image processing technique available in MATLAB. The method developed in this paper shows how the license number plate is extracted from the image and how characters are isolated for recognition. Image processing and pattern recognition is suggested for this simplified RTVLPIS.

Keywords— region-props, image, license plate, pattern recognition

I. INTRODUCTION

Monitoring vehicles for law enforcement and security purposes is a different problem because of the number of automobiles on the road today. An example of this lies in border patrol .Its time consuming and don't practically possible for an officer to physically check the license plate of the car. Additionally it's not feasible to employ a number of police officers to act as fulltime license palate inspectors. Police patrols cannot just drive in their cars starting at the palates of the other cars. Thus as a solution to this problem there exists a way for detecting an identifying license palate without constant human intervention This process or development of a method by which we can extract the license plate number of a vehicle from the image taken is known as vehicle license plate recognition system.(VLDRS).VLDR is also called in different references .Automatic vehicle car palate recognition, automatic number plate recognition, Optical character recognition for cars.

II. OBJECTIVE

The purpose of this paper is to build a real time application, which recognizes the license plate from cars at gate. For example at the entrance of the parking area. The system based on regular PC with in camera. Takes pictures of license plate of the car and process them. Once a license plate is detected and extracted its characters are then isolated. The focus is on recognition characters of the license palate this process is called optical recognition. The recognized characters are then displayed on GUI and checked with the database. Thus the focus is on the design of algorithms used for extracting the license plate from a single image isolating the characters of the plate and identifying the individual character. The process flow representation is shown in Fig: 1.

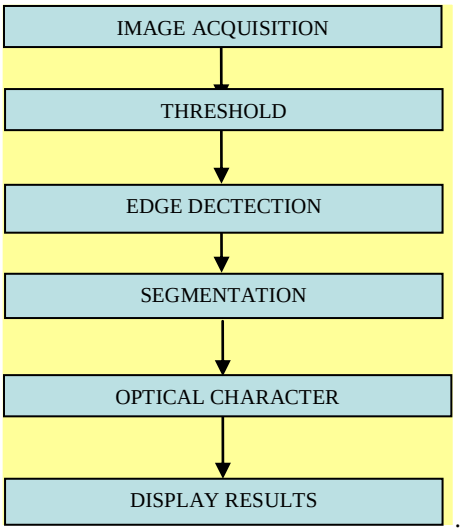

Fig 1. Process Flow representation

III. PROCESS FLOW REPRESENTATION AND DESCRIPTION.

The flow diagram for the vehicle license plate recognition system is as shown .It consists of the following steps.

IV. IMAGE ACQUISITION

Image acquisition [1] is the first process of the digital image processing for the image acquisition process we are considering the image acquisition tool in MATLAB as details in .The image acquisition toolbox in matlab extends the mat lab technical computing environment with functions for acquiring videos & images from PC compatible video devices. The toolbox connects to and configures the hardware, previews images and videos directly onto MATLAB for analysis and visualization. Some addition features of image acquisition toolbox include enabling single frame and continuous acquisitions, simultaneous image acquisition and image processing, logging image data.(Data can be logged to disk memory or both simultaneously .Its also possible to log each image frame or frames at specified intervals). Data can be logged into disks as compressed or uncompressed AVI streams. It's also possible to extract single images from a video stream and store them into disks in standard format such as BMP (Bitmap), JPEG (Joint Photographic Expert Group) and TIFF (Tag image file format) as specified in [2]. This paper supports bitmap and jpeg file format.

A. THRESHOLDING. Image processing is a much more effective when a monochrome image is used. Thus thresholding procedure is used, for this purpose consider a gray level histogram of an image. The image (i,m) composed of light object s on dark background in such away that the object and background pixels have gray levels grouped into two dominant modes. One obvious way to extract the object from background is to select a threshold ' 0' that separates these modes. Then any point a(m,n) for
a(m,n) >θ is called an object point t, otherwise its called background point.
Thresholding:
If a [m, n] >=θ,a [m,n] = object=1
Else a [m, n] = background=0
Thus thresholding is useful when one wants to separate bright objects of interest from a dark background or vice versa.

B.EDGE DETECTION. After the image is threshold the next step is to compute the edges of the license plate. This operation in effect reduces the amount of information contained in the source image by removing everything but edges in horizontal and vertical direction. This is highly desirable since its also reduces the number of points Hough transform has to consider. The threshold image is passed through the parallel sequences in order to get or extract horizontal and vertical segments respectively. The Hough transformations then produce a list of lines in the form of accumulator cells. These cells are then analyzed and line segments are computed. Finally the vertical and horizontal cells are combined and any rectangular regions are matching the dimensions of plate are kept as candidate regions.

C.HOUGH TRANSFORMS, The Hough transform is a method for detecting lines in binary images. This method was developed as an alternative to the brute force approach of finding lines, which was computationally expensive. The Hough transformation works by rewriting the general equation for line through (x_i,y_i)as

$$y_i = ax_i+b \text{ ---------- [1]}$$
$$b = - Xia+y_i \text{ ---------- [2]}$$

In practice above equation [2] is never used since the parameter an approaches infinite as lines becomes vertical. The following form is used

$$x\cos\theta + y\sin\theta = \rho' \quad [\rho - \text{called rho}]$$

Where θ angle between normal to the line and the x-axis and the 'ρ 'the parameter is the perpendicular distance between the line and the origin. The range of θ is +/- 22/7 and for an image with resolution of w x h the range of ρ is 0 to $\sqrt{(w^2 + h^2)}$.

D. NOISE ELEMINATION. Images acquired through the image acquisition process may be contaminated by a variety of noise sources. In our case the image might be distorted due to some of the following reasons improved punching of characters on metals. Degradation of metallic surface over a period of time presence of external on the license plate due to which the characters of the license plate may not be easily recognized by optical character recognitions as in [3]. Thus for the proper functioning and implementation noise elimination is essential as it helps in improving the quality of the image.

E.SEGMENTATION. In the analysis of the object in images its essential that we distinguish between the objects of the interest (The characters of the license plate)and the rest .The later group is also referred to the background. The techniques that are used for finding the objects of interest are also referred as segmentation in [4]. Segmenting the for ground form of background Image processing there are methods in which inputs are images but the outputs are the attributes extract from those images. Segmentation is the major step-in that direction segmentation divides the images in to its consistent regions or objects .The level of subdivision depends on the problem being solved. The segmentation should stop when the object of interest in an application have been isolated. Segmentation accuracy determines the eventual success or failures of overall computerized procedures Image segmentation algorithms generally based **o** two basic properties of intensity values. Discontinuity and similarity. In the first category the approach is to partition an image based on abrupt changes in intensity such as edges in an image .The Principle approaches in the second category are based on partitioning an image into regions that are similar according to a set of predefined criteria.

F. OPTICAL CHARACTER RECOGINITION. The goal of optical character recognition is to classify optical patterns (often contained in digital image) corresponding to alphabets or digits. The idea behind an implementation of a template matching based identification scheme is simple. One template pool, comprising of all 26 alphabet letters and 10 numerical digits is constructed .Once the license plate has been cut in to several characters each image contains a single character is evaluated in turn in the following way. The normalized correlation coefficient between the image of the character and the

template that yields the highest coefficient indicates what character is identified.

V. SOFTWARES INVOLVED

The MAT Lab VERSION6.0 is doing the implementation of the system MATLAB (Matrix Laboratory) [5]is a special purpose computer program optimized to perform Engineering and scientific calculations. MATLAB implements mat lab programming language and provides an extensive library of predefined functions that make technical task more easier and efficient,. It has more than 100 functions and various toolboxes, which extend their capabilities with many more functions in various specialties. *Advantages of MAT Lab***.** By using mat lab one can perform algebraic operations such has addition subtraction multiplication division which are used in the operations on images such as noise reduction by using averages moment deduction and algebraic masking, geometric transformations, rotations and scaling. Space domain operation such as histogram modifications (scaling, offset, amplitude change)Non linear point operation s(absolute value square root, log scale compression edge detection can be performed .Binary image processing as in [7], which includes theresholding and logic operations, can be performed provision for digital image coding and compression, compression measures loses compression entropy optimal coding. Mat lab has an image processing toolbox, which provides a comprehensive suite of reference standard algorithms and graphical tools for image analysis. Image analysis Includes edge detection segmentation morphology details in[8].

VI. PRACTICAL APPLICATION

Real time Vehicle license plate recognition system has a wide range of applications which use the extracted plate number to create automated solutions for various problems some of them are as follows as detailed in [6]. *Parking*-The palate number is used to automatically enter the prepaid numbers and calculate the parking fee for non members by company entry and exit times. *Access control*- A gate automatically opens for authorized members a secure area thus replacing or assisting the security guard .the events are logged on a database and could be use to search the history of events. *Tolling*-The license plate number is used to calculate the travel fee on a toll road or it can be use to double check the ticket**.** *Border control* - The car number is registered in the entry or exists to the country and its used to monitor the border crossings turnaround time and short the typical lines. *Stolen cars*- A list of stolen cars or un paid fines is used to alert n a passing hot car he block list can be updated I real time and provide an immediate alarms to the police force.6. Traffic control-The vehicles can be directed to different lane according to their entry permits. The system effectively reduces the traffic congestions and number of attendants. The details is represented in figure 2.

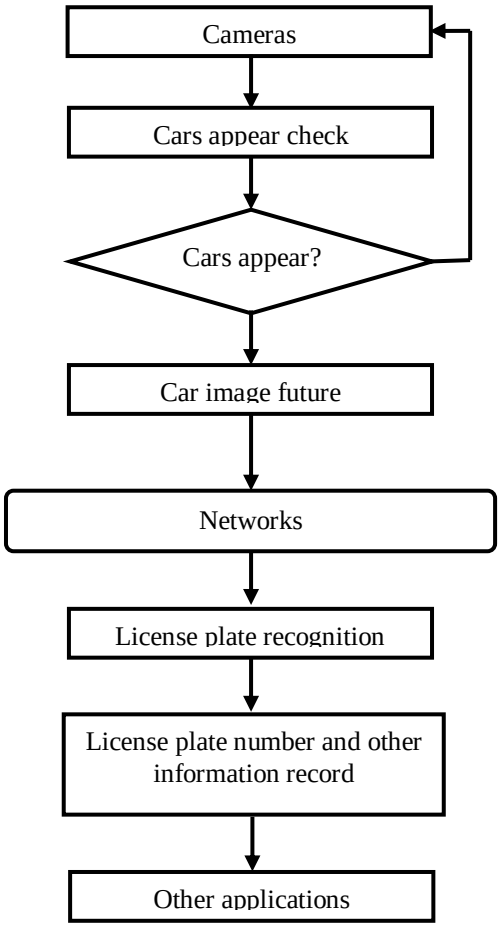

Fig: 2 Process flow representation.

Fig 3: Gray image

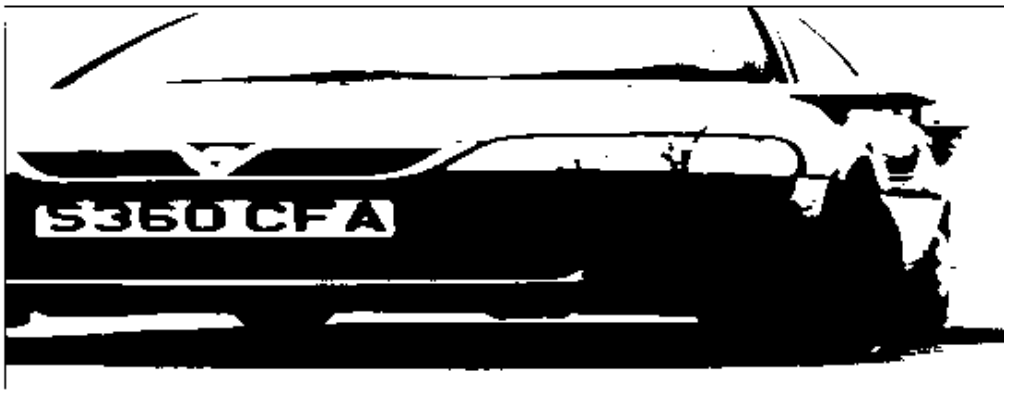

Fig 4: Threshold image

Fig 5: Number plate extraction

Fig 6: Character isolated

S360CFA

Fig 7: Recognized number

Fig 8: Real Time Recognition.

VII. CONCLUSION

The Computationally balanced image processing and pattern recognition for RTVPIS is developed in this paper. The process deploys the region_prop technique in mat_lab. This new algorithm is suited for various real time applications such has Parking, Access control, Tolling, Traffic control Stolen cars. This RTVPIS is well suited for real time implementation.

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