# Car License Plate Detection using Structured Component Analysis

[1]Siva Vinayaka Pavana Hiranya P, [2]S. Venkata Suresh, [3]T. Sabhanayagam

[1,2]B.Tech(SE), [3]Assistant Professor (S.G)
Department of Software Engineering, SRM University, Chennai, India
[1]psvphiranya@gmail.com, [2]sajjavenkatasuresh@gmail.com, [3]stsabha@gmail.com

***Abstract* - The paper presents Car license plate detection (CLPD) system using Vertical Edge Detection Algorithm(VEDA) and Structured component algorithm are used for accurate identification. First the recognition system starts with character identification based on number plate extraction, Splitting characters and Text matching. The system model uses already captured images for this recognition process. The system uses different images of plates for identifying the characters from input image. After character recognition, an identified group of characters will be compared with database number plates for authentication and grant of access.**

***Keywords* - CLPD, VEDA, Structured Component, character recognition, Authentication.**

## I. INTRODUCTION

From years, intelligent transportation systems (ITSs) have had a wide impact in people's life as their scope is to improve transportation safety and mobility and to enhance productivity through the use of advanced technologies. In large companies, organizations and Residential areas the various forms of management of parking lot system can be accomplished in many ways such as hiring security guards to give and then receive car parking cards from driver, using RFID (Radio- Frequency Identification) technology in sensory system, etc., To make it more effective CCTV's are installed all this is to provide secure parking and to utilize space properly but still have some drawbacks like long waiting time to get pass checking. To maintain it we need to hire security personnel in large number. Similar issues are faced in heavy traffic and highway toll gates. All this process leads to huge maintenance issues. This paper describes way to resolve all this issues based on image processing technology used to identify vehicles aby capturing their car license plates (CLPs).

The CLP recognition technology is known as automatic number-plate recognition, automatic vehicle identification, CLP recognition, or optical character recognition for cars. . The CLP detection and recognition system (CLPDRS) consists of three parts: license-plate (LP) detection (LPD), character segmentation, and character recognition. Among these, LPD is the most important part in the system because it affects the system's accuracy. To create a successful and fast CLP detection system (CLPDS) there are many issues that should be resolved like poor image quality, plate sizes and designs, processing time, and background details and complexity. In vehicle tracking systems, for crime prevention cameras are used and installed in front of police cars to identify those vehicles. Usually, numerous vehicle tracking and pursue systems use outstanding cameras, and this leads to cost increment of the system in both hardware and software.

LP recognition system with lower cost of its hardware devices, will make it more practical and usable than before. This paper proposed a method for CLPD, in which camera with low resolution is used instead of a more sophisticated web camera. In this paper, the web camera is used to capture the images, and an offline process is performed to detect the plate from the whole scene image. Vertical edge extraction and detection is an important step in the CLPDRS because it affects the system's accuracy and computation time. To make it an adaptable system Vertical edge detection algorithm (VEDA) and Structured Component algorithm is used for its implementation.

## II. RELATED METHODS AND DESCRIPTION

### A. PROBLEM DESCRIPTION:

Many large companies, organizations and Residential areas facing some issues regarding parking system. For maintaining parking system there are hiring security and installing CCTV's. After all this effort still they are facing many complications about it.To make it easy and affordable process Car License Plate Detection system plays an important role. VEDA and ULEA algorithms are used to increase the computing speed.

The heavy database utilization needs to be reduced comparatively to the previous existing system.

### B. PRODUCT ARCHITECTURE:

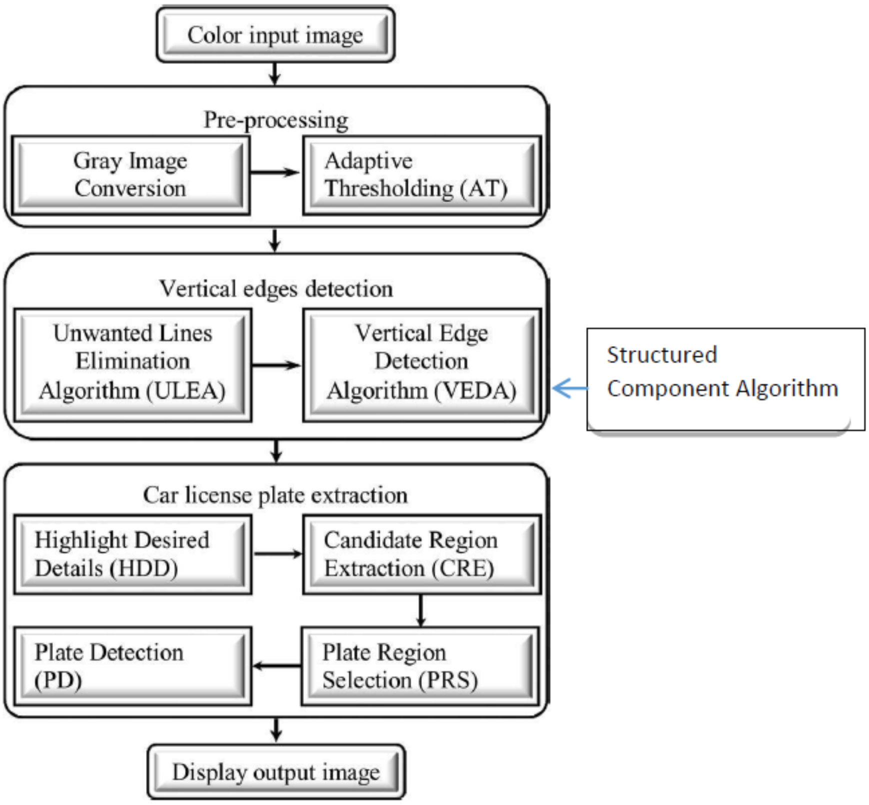


Fig 1: Flowchart of the methods involved

- After vehicle image is captured it will be sent to pre processing phase where Gray Image Conversion and Adaptive Thresholding takes place.
- In second phase Unwanted Lines Elimination Algorithm (ULEA) and Vertical Edge Detection Algorithm (VEDA) are implemented to remove unwanted lines and scan the license plate
- In third phase Desired Details are Highlighted in the image and extracts the region of the candidate and plate.

C. PRODUCT FUNCTIONS

- It performs a rapid solution for unauthorized vehicles entered into security region
- Shows the licence number and the details of the owner/registered personnel.
- Sign of accuracy and complexity is the virtue of the product.

D. DESIGN AND IMPLEMENTATION

Process Flow

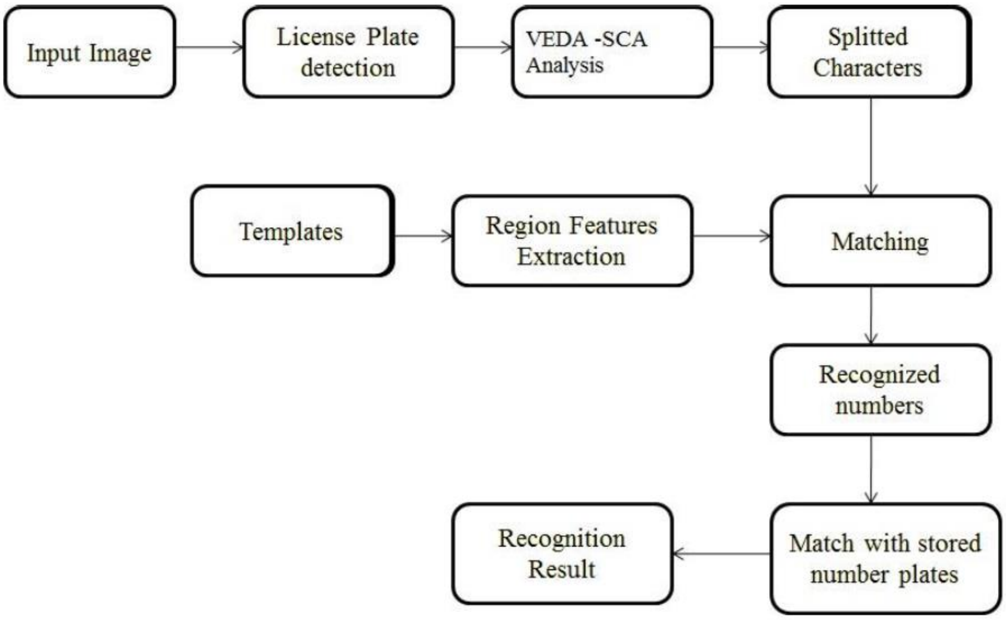


Fig 2 : Block Diagram Depicting the structured Flow

- This application is developed using MatLab.
- A Mix algorithm is used for better complexity as such Vertical Edge Detection Algorithm for detecting the edges effectively and Speed Up Robust Features algorithm for minimal time complexion.
- We use these algorithms effectively in different stages as such the complete product execution time and the data retrieval methods used increases the efficiency of the product.
- All the sequential intermediate methodologies are written in the order as mentioned above process flow schematic diagram.

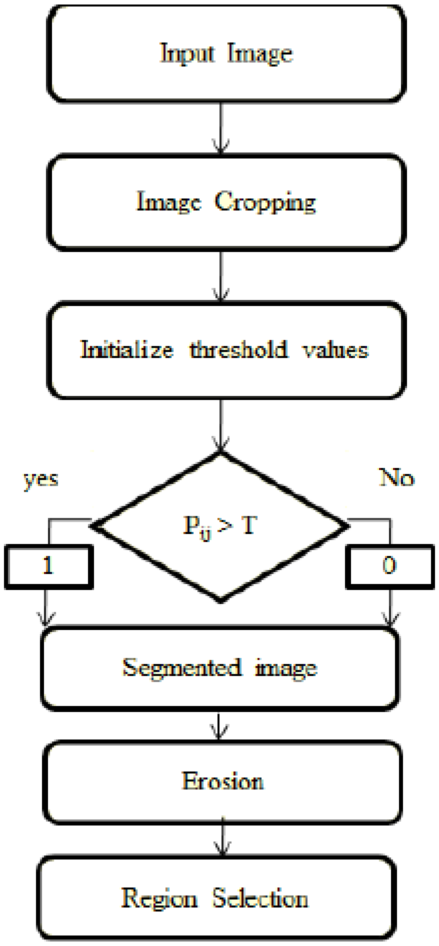


Fig 3 : Process Flow Diagram of the CLPD

## III. PROPOSED METHOD FOR CAR LICENSE PLATE DETECTION

### A. Overview

This paper mainly contributes The proposed VEDA used for detecting vertical edges; the proposed CLPD method processes low-quality images produced by a web camera, which has a low resolution; and the computation time of the CLPD method is less than several methods. In this paper, the color input image is converted to a grayscale image, and then, adaptive thresholding (AT) is applied on the image to constitute the binarized image. After that, the ULEA is applied to remove noise and to enhance the binarized image. Next, the vertical edges are extracted by using the VEDA. The next process is to detect the LP using structured component analysis; the plate details are highlighted based on the pixel value with the help of the VEDA output. Then, some statistical and logical operations are used to detect candidate regions and to search for the true candidate region. Finally, the true plate region is detected in the original image. The flowchart of the proposed CLPD method isshown in Fig. 1.

### B. Grey-Scale and Adaptive Threshold

1)Grey-Scale: The color image is taken as input at the beginning and that image s converted into black and white image. That converted black and white image again undergoes grey scale operation using the consequent operation this helps to upgrade the method used

2) Adaptive Threshold: After the color input image is converted to grayscale, an AT process is applied to constitute the binarized image. Bradley and Roth recentlyproposed real-time AT using the mean of a local window, where local mean is computed using an integral image. To get a good adaptive threshold, the method proposed in is used. The AT technique used in this paper is just a simple extension of Bradley and Roth's andWellner's methods. The idea in Wellner's algorithm is that the pixel is compared with an average of neighboring pixels. Specifically, an approximate moving average of the last S pixels seen is calculated while traversing the image. If the value of the current pixel is T percent lower than the average, then it is set to black; otherwise, it is set to white. This technique is useful because comparing a pixel to the average of neighboring pixels will keep hard contrast lines and ignore soft gradient changes. The advantage of this technique is that only a single pass through the image is required. Wellner uses one eighth of the image width for the value of S and 0.15 for the value of T to yield the best results for a variety of images. The value of T might be a little bit modified from the proposed value by Wellner depending on the used images. However, Wellner's algorithm depends on the scanning order of pixels. Since the neighborhood samples are not evenly distributed in all directions, the moving average process is not suitable to give a good representation for the neighboring pixels. Therefore, using the integral image has solved this problem.

3) VEDA :The advantage of the VEDA is to distinguish the plate detail region, particularly the beginning and the end of each character. Therefore, the plate details will be easily detected, and the character recognition process will be done faster. After hresholding and ULEA processes, the image will only have black and white regions, and the VEDA is processing these regions. The idea of the VEDA concentrates on intersections of black–white and white–black .A 2 × 4 mask is proposed for this process, as shown in, where x and y represent rows and columns of the image, respectively. The center pixel of the mask is located at points (0, 1) and (1, 1). By moving the mask from left to right, the black–white regions will be found. Therefore, the last two black pixels will only be kept. Similarly, the first black pixel in the case of white–black regions will be kept. This process is performed for both of the edges at the left and right sides of the object-of-interest. The first edge can have a black-pixel width of 2, and the second edge can have a black-pixel width of 1.

4) Experimental Setup:
The implementation steps can be summarized as follows.

1. The web camera is set to active profile "live" and isconnected to a laptop.
2. The devices described in (step 1) are taken to an outdoorenvironment.
3. The web camera is focused on the car LP.
4. The distance between the web camera and the LP rangesfrom 2 to 4 m.
5. Theweb-camera pan angles are in between+20◦ and−20◦, whereas camera tilt is set from 0◦ to 20◦
6. The captured samples contain different backgrounds and objects such as trees and two LPs.

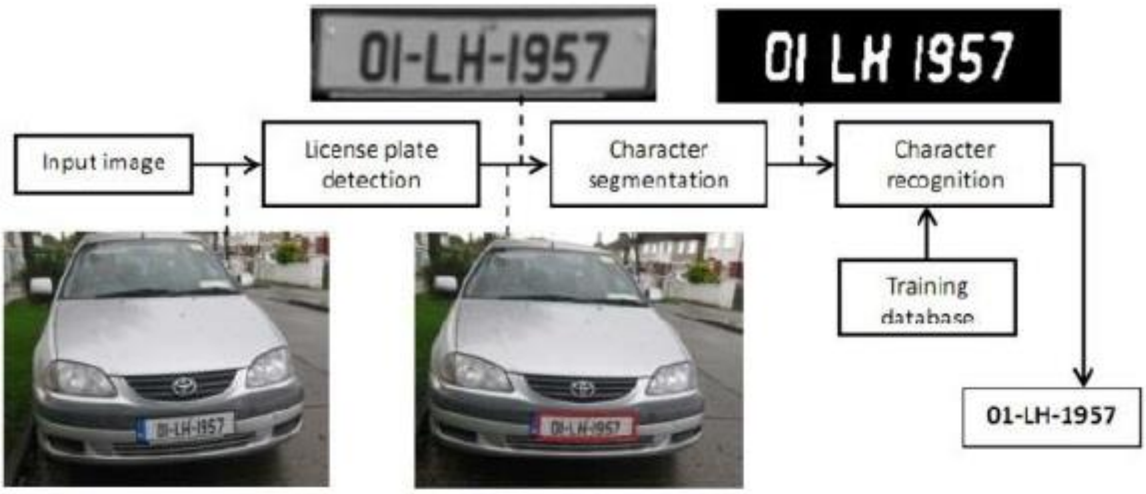


Fig 4: The complete process Pictorial representation

## VI. CONCLUSION

We have formulated a new and fast method using verticaledge detection, in which its performance is faster than theperformance of Sobel by five to nine times depending on imageresolution. The VEDA contributes to make the whole proposedCLPD method faster. We have proposed a CLPD method in which data set was captured by using a web camera. Only one LP is considered in each sample for the whole experiments. In the experiment, the rate of correctly detected LPs is high In addition, the computation time of the CLPD method is low, which meets the real-time requirements. Finally, the VEDA-and Structured Component based CLPD are used, and the findings show that VEDA-SCA CLPD is better in terms of the computation time and the detection rate.

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