

Automatic vehicle number plate detection and recognition using image processing

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ABSTRACT

Automatic Number Plate Detection and Recognition is a framework which is utilized to perceive the vehicle number plate from a picture having a still and moving photo of a vehicle. It is a noteworthy improvement in the innovation which is utilized to law execution and movement controlling. The adjustments in the number plate sort and natural conditions are considered in this undertaking. This innovation utilizes particular sort of cameras to track and distinguish the vehicles number and track their action effectively. Due to sudden increment in vehicles over the world it is extremely testing assignment to keep up record of every one of these vehicles and to discover unlawful exercises effectively. Hence it is critical to monitor every one of these vehicles by the separate experts. To make their enormous assignment basic this method is created which help them a ton in their management. KeyWords - Automatic Number Plate Recognition, Feature Selection, input image, preprocessing, Filtering, Extraction, edge enhancement, Segmentation, recognition.

I. INTRODUCTION

Automated number plate recognition is a very relevant topic that is gaining importance. With the amount of accidents taking place each year, this tool can be used in monitoring the speed of vehicles. This could also be used in reducing bottlenecks at toll centers. One could also design a system wherein the vehicle license plate detection provides added convenience of automatically charging a driver's bank account instead of having to stop and pay providing better traffic congestion information. The first step in the recognition process is taking input image. After this, some type of filtering algorithm must be perform to transform an image to a string consisting of the license plate number. One would require doing basic preprocessing like image enhancement, plate area localization and noise reduction and morphological operations are applied on an image.

An important characteristics of a license plate is its definite rectangular shape, which can also be exploited for localization purposes. This would have to be followed by Image segmentation, where individual characters. are identified based on their orientation. A simple way to localize these features is to examine edge using edge detection method. A thresholding algorithm then can be applied to obtain a binary edge image. Then

segmentation is used to separate the foreground from background. Combining these, areas of high activity can be localized. Finally character recognition and extraction could be performed on the number plate.

II. METHODOLOGY

1. **Input image**
2. **RGB to gray conversion**
3. **Filtering**
4. **Morphological operation**
5. **Edge detection**
6. **Segmentation**
7. **Number Extraction**

- **BLOCK DIAGRAM**

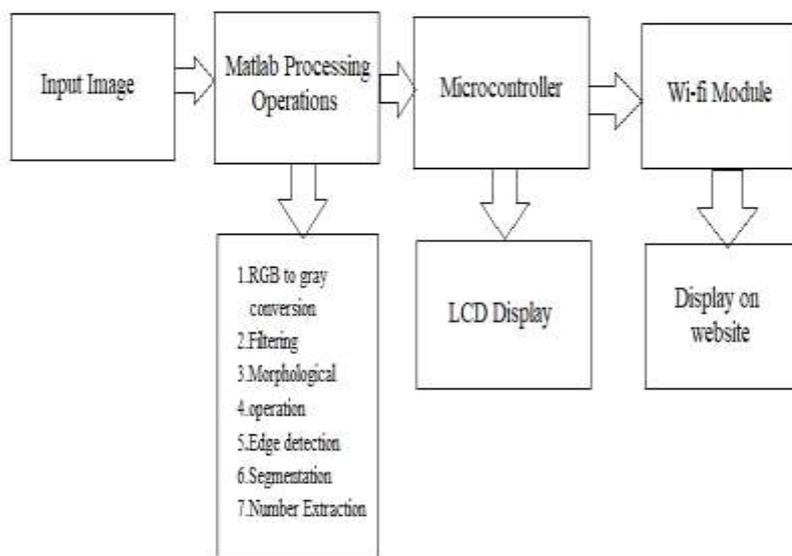


Fig. Block diagram

(1) Filtering

The **median filter** is a nonlinear digital filtering technique, often used to remove noise from an image or signal. Such noise reduction is a typical pre-processing step to improve the results of later processing (for example, edge detection on an image). Median filtering is very widely used in digital image processing because, under certain conditions, it preserves edges while removing noise (but see discussion below), also having applications in signal processing.

(2) Morphological operation

Morphological operators often take a binary image and a structuring element as input and combine them using a set operator (intersection, union, inclusion, complement). They process objects in the input image based on characteristics of its shape, which are encoded in the structuring element. The mathematical details are explained in Mathematical Morphology.

For the basic morphological operators the structuring element contains only foreground pixels (*i.e.* ones) and 'don't care's'. These operators, which are all a combination of erosion and dilation, are often used to select or suppress features of a certain shape, *e.g.* removing noise from images or selecting objects with a particular direction.

The more sophisticated operators take zeros as well as ones and 'don't care's' in the structuring element. The most general operator is the hit and miss, in fact, all the other morphological operators can be deduced from it. Its variations are often used to simplify the representation of objects in a (binary) image while preserving their structure, *e.g.* producing a skeleton of an object using skeletonization and tidying up the result using thinning.

(3) Segmentation

In computer vision, **image segmentation** is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.^{[1][2]} Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of extracted from the image

While not the fastest method of collision detection, Bounding Box (BB) is often a favourite among many developers. Put simply, this technique involves checking whether an object has intercepted (overlapped) an invisible square boundary that is usually placed over, and often remains relative to, a game object.

(4) Edge Detection

As a BB consists of four sides (making a square), a BB collision routine needs four values for each BB involved: a location vector (the x and y position of the BB object), as well as the BB's height (h) and width (w). Using these four values we can calculate:

- The location of the top-left corner of the BB (x, y)
- The location of the top-right corner of the BB (x + w, y)
- The location of the bottom-left corner of the BB (x, y + h)
- The location of the bottom-right corner of the BB (x + w, y + h)

(5) Number Extraction

In machine learning, pattern recognition and in image processing, **feature extraction** starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction.

When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features (also named a feature vector). Determining a subset of the initial features is called *feature selection*.^[1] The selected features are expected to contain the relevant information from the input data, so that the desired task can be performed by using this reduced representation instead of the complete initial data.

III. LITRATURE SURVEY

Sr. No.	Name of paper	Year of publish	Methodology used	Result	Limitations
1.	Efficient Method for Vehicle Number Plate Extraction and Character Segmentation.	2010	Removing the Plate region, edge location calculation and vertical projection technique are utilized.	Final system Efficiency=80%	The proposed strategy is basically intended for constant Malaysian Number plate.
2.	Vehicle number plate recognition using multiple layer back propagation neural networks.	2011	For the Number plate acknowledgment initially picture transformation in paired and apply to neural system, and apply mpl calculation, at that point recognition singular image, by network mapping.	average recognition rate..	The caught picture 2-3 meters detracted from the cameras.
3.	Indian vehicle Number plate extraction and segmentation.	2011	(1)Preprocessing of Image by histogram adjustment. (2)Extraction of plate locale by edge discovery calculation(3)Segmentation of characters (4)Median filtering all above methods.	General exactness of our framework is 84.00%.	proposed strategy is touchy to the point of view, physical appearance and environmental conditions.
4.	A Real-Time License Plate Recognition System for Saudi Arabia using lab view.	2012	Image Enhancement .Then setting Morphological Operations like dilation and erosion Character Segmentation and Recognition by neuron execution.	work normal in the ongoing condition.	for the overall system, while the some more work is to be done to make the technique more efficient.

5.	Automatic License Plate Recognition(ALPR): A State – of –the –Art Review.	2013	The authors considered the different variations in number plates detection.	This method have accuracy is nearly about 75%	Difficulties looked by ANPDR is chiefly ecological issues or the varieties in the tag. Different elements which incorporate are recently the plate situating.
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IV. ADVANTAGES AND APPLICATIONS

ADVANTAGES

1. Improving road safety.
2. Reduces crime.
3. Higher efficiency.
4. Less maintenance required.
5. Giving a greater police presence.
6. Pre-paid parking members can be easily differentiated from non-members.

APPLICATIONS

- **Parking** :- The NPR is used to automatically enter prepaid members and calculate parking fee for non-members.
- **Access control** :- A gate automatically opens for authorized members in a secured area, thus replacing or assisting the security guard.
- **Tolling** :- The car number is used to calculate the travel fee in a toll-road or used to double check the ticket.
- **Border Security** :- The car number is registered in the entry or exits to the country and used to monitor the border crossings.
- **Traffic Control** :- The vehicles can be directed to different lanes according to their entry permits. The system reduces the traffic congestions and number of attendants.

V. CONCLUSION

With the assistance of writing an literature review and a few outcomes the conclusion is determined that the automatic vehicle number plate recognition technique performs viably on an info picture. Furthermore, the vehicle number was accomplished effectively.

VI. FINAL RESULTS OF AUTOMATIC VEHICLE NUMBER PLATE DETECTION AND RECOGNITION USING IMAGE PROCESSING.

Thus we have successfully design and run Automatic Vehicle Number Plate Detection and Recognition using image processing. In this project we identify the vehicle number using various image processing techniques and display on LCD and website also.

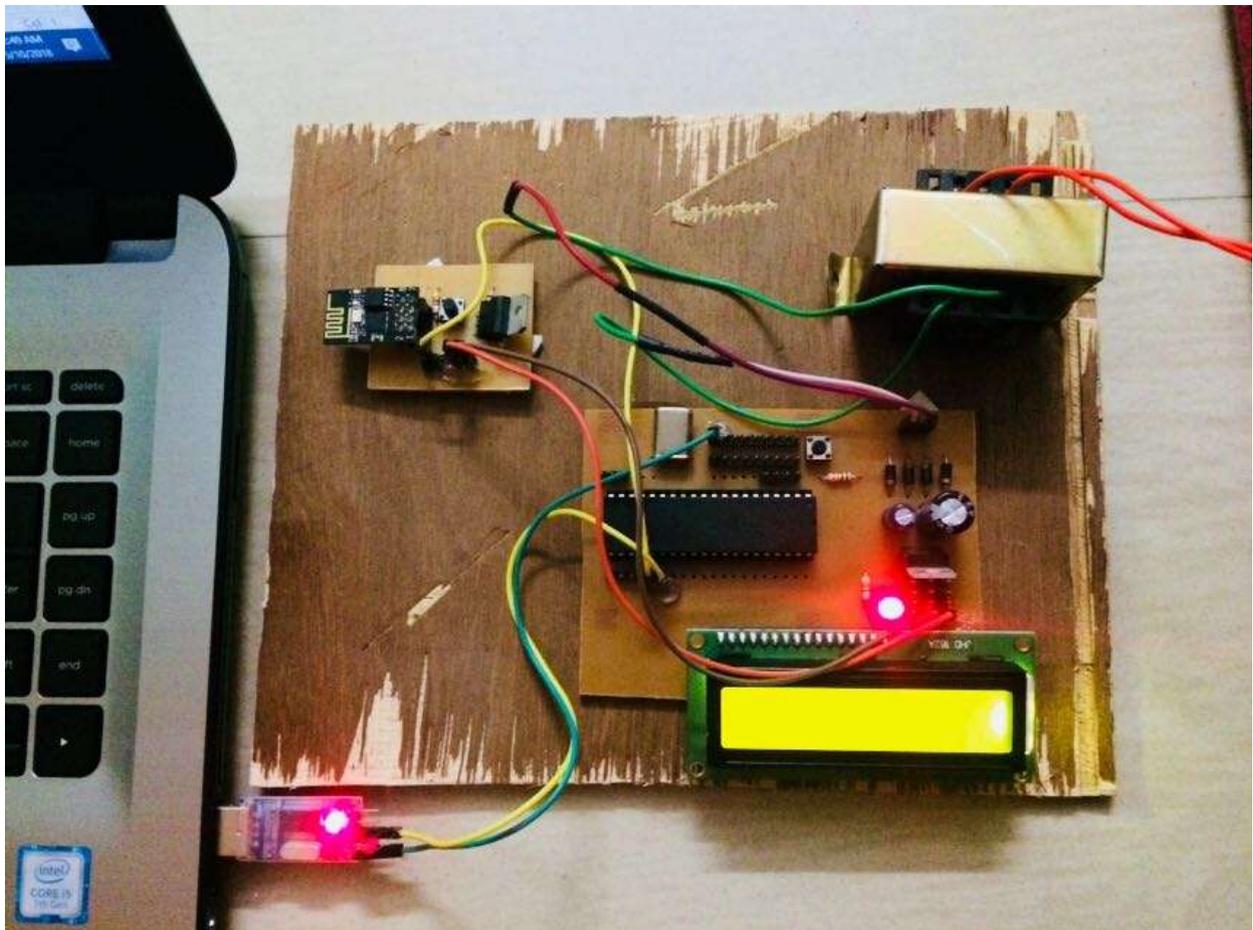


Fig. Automatic vehicle number plate detection and recognition using image processing.

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