

License Plate Extraction by Using Raspberry PI3

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Abstract

Vehicle's license plate recognition system has been a special area of interest in video surveillance area for more than a decade or so. With the advent of sophisticated video vehicle detection systems for traffic management applications, number plate recognition system finds wide varieties of places to fit itself beyond just controlling access to a toll collection point or parking lot. It can now be integrated to the video vehicle detection systems which usually are installed in places of interest for intersection control, traffic monitoring etc., to identify vehicle that violates traffic laws or to find stolen vehicles. Here we are implementing this project in the stream of image processing to identify number plate and data is being processed in MATLAB. The same information is sent to the raspberry pi to display on 16x2 LCD.

Literature survey

Edge Detection An Edge is a point at which the brightness in an image changes sharply. Mathematical methods that identify points where brightness changes sharply in an image are called as edge detection techniques. Edge detection is basic method for characteristic detection or extraction. Different edge detection algorithm / operators such as Vertical Edge Detection & Sobel operator are used for edge detection. In and vertical edges of vehicle images were enhanced using sobel operator with a high accuracy rate that gives binary image. This is followed by removing noise & most of background making it easy to Filter-Out The Long and Short Edges these techniques yield an accuracy rate of over 97% which is good enough to be used in real time system. Figure below

demonstrates a vertical edge image followed by sobel operator applied to remove unwanted edges.

Morphology Morphological image processing is a set of non-linear operations that are related to the image characteristics. These operations rely only on relative ordering of pixel values. Hence morphology is well suited for binary image processing. Morphological processing can be used to detect license plate by comparing the contrast between the background plate and letters, the license plate detection rate is high after applying morphological image processing. Following image demonstrates the use of morphological operations.

Region Segmentation Sliding concentric window is a Segmentation technique used for Region Segmentation. A new method is being planned to examine roadside images which frequently contains vehicles and extort license plate from usual properties by finding vertical and horizontal boundaries from vehicle section. The SCWs are base on the arithmetical dimension of standard difference. While working with this technique, all pixels in the picture are inspect one by one in terms of gratifying a comparison rule about the standard difference values of nearest areas. The algorithm was urbanized and implemented as follows: Creation two concentric casement in which A of size $(X1) \times (Y1)$ pixels and B of size $(X2) \times (Y2)$ pixels; correspondingly.

Computation of the standard difference of the pixels in Casement A(stdA) and B(stdB). Description of segmentation rule: if the standard difference ratios of the two casements surpass a doorstep set by the user,

then the central pixel of the Casement is considered to belong to a vertical and horizontal region. Sliding concentric window is used for faster detection of regions in dissimilar usual backgrounds and algorithmic sequence managing plates of different size and positions.

Motivation

1. Automatic license plate recognition could be used to automatically open a gate or barrier into a secured area for authorized members. This could replace or assist security guards at the gates or barriers of premises.
2. If a vehicle is stolen, it could be marked in the license plate recognition system as so. If at any point the stolen vehicle happens to pass a camera on the roadside that belongs to the license plate recognition system an alarm is set off to alert a guard.
3. To control the Traffic flow management.

Methodology

Block diagram

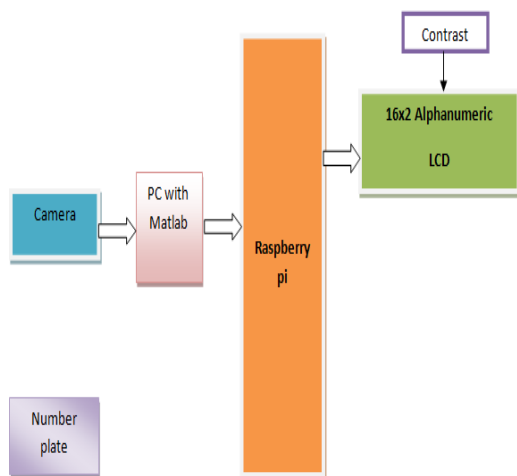


Fig1 system block diagram

This paper presents a method of vehicle license plate Character recognition. The whole system into three following steps:

- 1- Plate location or finding location of plate in the vehicle image and cropping plate image from it.
- 2- Plate segmentation or cutting plate image to character's images.
- 3- Character recognition or convert character's images to final distinguished characters among them.

RASPBERRY-PI



Fig2 The Raspberry Pi has a Broadcom (SoC).

Features

- System Memory – 1GB LPDDR2
- Storage – micro SD card slot (push release type)
- Video & Audio Output – HDMI and AV via 3.5mm jack.
- Connectivity – 10/100M Ethernet
- USB – 4x USB 2.0 ports, 1x micro USB for power
- Expansion
 2x20 pin header for GPIOs
 Camera header
 Display header
- Power – 5V via micro USB port.
- Dimensions – 85 x 56 mm

Basic Hardware of Raspberry-PI

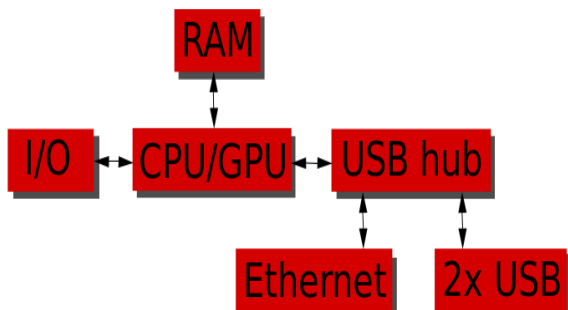


Fig3 OS used in Raspberry pi is Linux

Discussions

- Images containing texture and background objects.
- Presence of regular structure called bumper near (above/ below) the license plate, which is same dimension as license plate,
- If the lighting conditions are not fair enough, performing binarization after morphological top-hat operations leads to loss of characters from the license plate.
- Few car images also consist of brand names, captions and other symbols in addition to license plates, which are difficult cases for segmentation

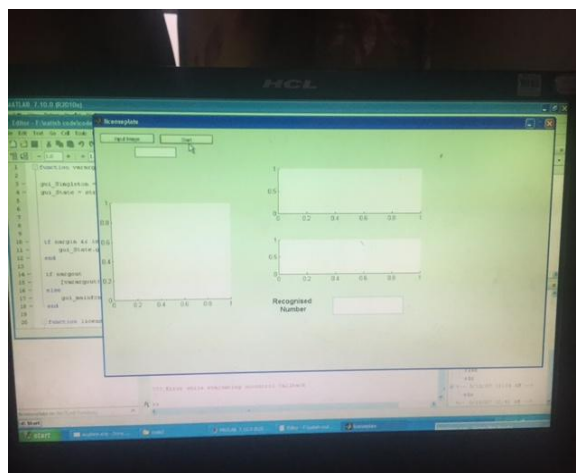


Fig 5 mat lab waiting for license plate

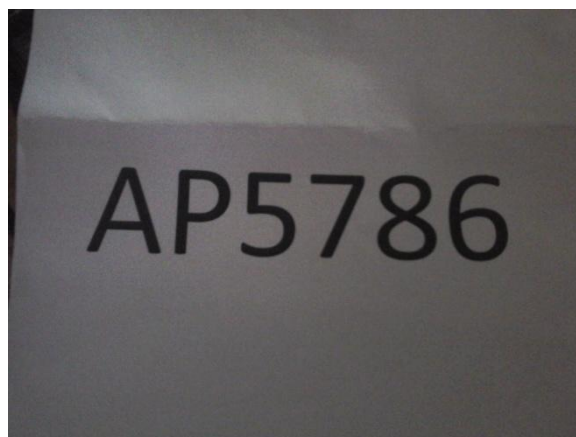


Fig 6 license plate

EXPERIMENTAL RESULT

From fig 4 to

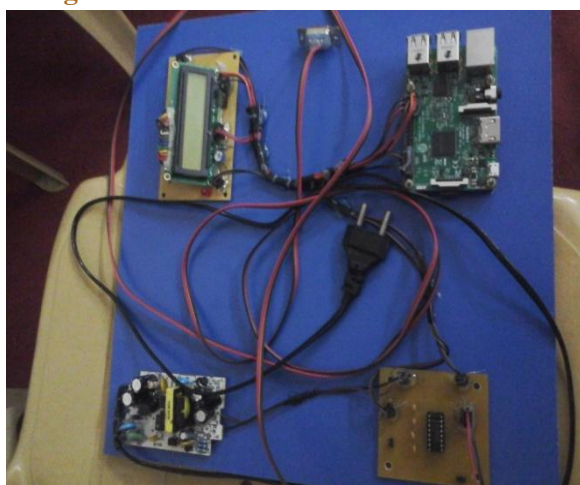


Fig 4 kit

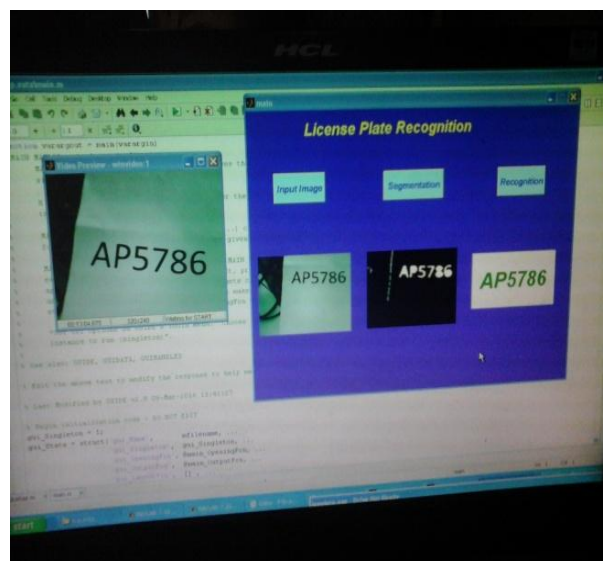


Fig 5 license plate extracted

Conclusion

Detection works for complex environments like low illumination, image containing multiple background objects, texture and brand names. Accuracy of LP detection is 100% for country wise parameters and 95% for global case.

LP Recognition accuracy on average from test sets is 88.54%. Features like character height, spacing, LP height and width are used for LP detection.

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