Automatic License Plate Recoganization System Based on Image Processing Using LabVIEW

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Abstract—Automatic License Plate Recognition (ALPR) is the extraction of vehicle license plate information from an image or a sequence of images. The quality of the acquired images is a major factor in the success of the ALPR. ALPR as a real life application has to quickly and successfully process license plates under different environmental conditions, such as indoors, outdoors, day or night time. This system is based on regular PC with camera to acquire live images of vehicle which include a vehicle car license plate. Processes acquired images to find out license plate and convert those characters into string by using OCR algorithm. The Proposed system has been implemented using Vision Assistant & LabVIEW.

Index Terms—Image Acquisition; Image Scissoring; License Plate Extraction; Segmentation; optical character recognition (OCR)

I.   INTRODUCTION

ANPR is a mass surveillance system that captures the image of vehicles and recognizes their license number. License Plate Recognition is an image-processing technology that is used to identify vehicles by their license plates. A license plate reader works by extracting the characters from an image. This technology is used for many applications such as toll booths, parking decks, border control, and law enforcement. Our system will provide a way to detect and identify license plates without constant human intervention. The aim of this project is three-fold; first, we will look at Optical Character Recognition techniques and investigate the process of license plate recognition from acquiring an image; second, we will develop a database that contains the user information; and finally, we will store the information to the database and presenting in a report form using GUI.

LPR system has the following four stages:
1.   Image Acquisition
This phase deals with acquiring an image by an acquisition method. In our proposed system, we used a high resolution digital camera and adequate light source to acquire the input image.

2.   License Plate Extraction
This phase extracts the region of interest, i.e., the license plate, from the acquired image. The proposed approach involves "Masking of a region with high probability of license plate and then scanning the whole masked region for license plate".

3.   License Plate Character Segmentation
License Plate Segmentation, which is sometimes referred to as Character Isolation takes the region of interest and attempts to divide it into individual characters. In the proposed system segmentation is done in the OCR section.

4.   Optical Character Recoganization
There are many methods used to recognize isolated characters. In the proposed system we are using Optical Character Recognition which is an inbuilt feature in Vision Assistant.

II.   APPLICATION AREA FOR ALPR

The main advantage is that the system can store the image record for future references. Some of the applications are as follows:-
1.   Parking lot management
2.   Automatic Toll Booth on highway
3.   Border Crossing
4.   Mass material management system
5.   Traffic monitoring
6.   Homeland Security

III. IMPORTANT ASPECTS OF ALPR

1. Camera
2. Illumination/ light source
3. Image digitizer/ convertor
4. Sensor interface hardware
5. Computer
6. Software
7. Database

IV. STEPS OF IMAGE ACQUISITION

Snapping an image:

1. Click File » Acquire Image.
2. Click Acquire Image in the Acquisition function list.
3. Select the appropriate device and channel.
4. Click the Acquire Single Image button to acquire a single image with the IMAQ device and display it.
5. Click the Store Acquired Image in Browser button to send the image to the Image Browser.
6. Click Close to exit the Parameter window.
7. Process the image in Vision Assistant.

V. IMAGE PROCESSING

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image.

VI. PURPOSE OF IMAGE PROCESSING

The purpose of image processing is divided into 5 groups. They are:

1. <u>Visualization</u> - Observe the objects that are not visible.
2. <u>Image sharpening and restoration</u> - To create a better image.
3. <u>Image retrieval</u> - Seek for the image of interest.
4. <u>Measurement of pattern</u> – Measures various objects in an image.
5. <u>Image Recognition</u> – Distinguish the objects in an image

VII. STEPS OF IMAGE PROCESSING TO BE FOLLOWED

1. Image analysis functions.
2. Color image processing functions.
3. Grayscale image processing and analysis functions.
4. Binary processing and analysis functions.
5. Machine vision functions.

Fig.1. Initial Image

Fig.2 Final Result
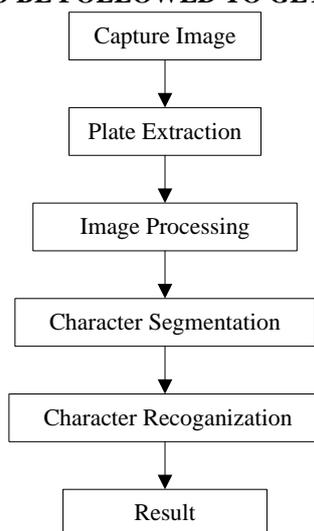
VIII.   STEPS TO BE FOLLOWED TO GET THE FINAL RESULT

```
         Capture Image
              │
              ▼
        Plate Extraction
              │
              ▼
       Image Processing
              │
              ▼
     Character Segmentation
              │
              ▼
    Character Recoganization
              │
              ▼
            Result
```

Fig.3 Steps for Output

IX. OPTICAL CHARACTER RECOGANIZATION

Optical Character Recognition (OCR) is a type of document image analysis where a scanned digital image that contains either machine printed or handwritten script is input into an OCR software engine and translating it into an editable machine readable digital text format. A set of characters in the word block are recognized until all likely characters have been found for the word block. We train the OCR software by providing a character value for each of the segmented characters, creating a unique representation of each segmented character.
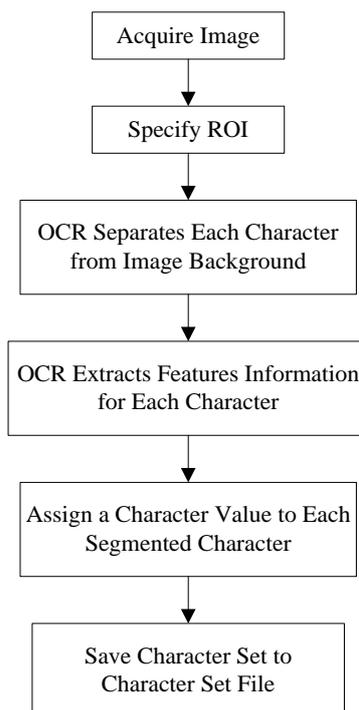
```
          Acquire Image
               │
               ▼
           Specify ROI
               │
               ▼
    OCR Separates Each Character
       from Image Background
               │
               ▼
    OCR Extracts Features Information
         for Each Character
               │
               ▼
   Assign a Character Value to Each
        Segmented Character
               │
               ▼
      Save Character Set to
        Character Set File
```

Fig.4 Steps of OCR

X.   ONCLUSION

The process of vehicle number plate recognition requires a very high degree of accuracy when we are working on a very busy road or parking which may not be possible manually as a human being tends to get fatigued due to monotonous nature of the job and they cannot keep track of the vehicles when there are multiple vehicles are passing in a very short time .To overcome this problem, many efforts have been made by the researchers across the globe for last many years. A similar effort has been made in this work to develop an accurate and automatic number plate recognition system. We get an overall efficiency of 98% for this system. Though this accuracy is not acceptable in general, but still the system can be used for vehicle identification. It may be concluded that the project has been by and far

successful. It can give us a relative advantage of data acquisition and online warning in case of stolen vehicles which is not possible by traditional man handled check posts. While thousands of vehicles pass in a day. Though we have achieved an accuracy of 98% by optimizing various parameters, it is required that for the task as sensitive as tracking stolen vehicles and monitoring vehicles for homeland security an accuracy of 100% cannot be compromised with. Therefore to achieve this, further optimization is required. So this work can be further extended to minimize the errors due to them.

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