

AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM USING IMAGE PROCESSING

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ABSTRACT

Automatic Number Plate Recognition system (ANPR) is an application of computer vision and image processing technology that takes photograph of vehicles as input image and by extracting their number plate from whole vehicle image, it displays the number plate information into text. The overall accuracy and efficiency of whole ANPR system depends on number plate extraction phase as character segmentation and character recognition phases are also depend on the output of this phase. Further the accuracy of Number Plate Extraction phase depends on the quality of captured vehicle image. Higher be the quality of captured input vehicle image more will be the chances of proper extraction of vehicle number plate area.

KEYWORDS Image processing, Extraction, Segmentation, Template matching.

OVERVIEW

Automatic Number Plate Recognition System (ANPR) is an application of computer vision and image processing technology that takes photograph of vehicles as input image and by extracting their number plate from whole vehicle image, it displays the number plate information into text. Efficient methodologies are developed to detect a number plate in various luminance conditions and the output is displayed by extracting the number plate data from the image.

INTRODUCTION

The main objective of this paper is to recognize the number plate from an image provided by a camera and giving out the text data as a output from that image. A Number plate recognition system can be divided into the following steps:

- Image Acquisition and pre processing
- Number plate extraction
- character segmentation
- character recognition

EXISTING SYSTEM

License plate detection is widely considered as a solved problem with many systems already in operation. The existing methods of ANPR works well for dark and bright/light categories image but it does not work well for Low Contrast, Blurred and Noisy images and the detection of exact number plate area by using the existing ANPR approach is not successful even after applying existing filtering and enhancement technique for these types of images. Due to wrong extraction of number plate area, the character segmentation and character recognition are also not successful in this case by using the existing method.

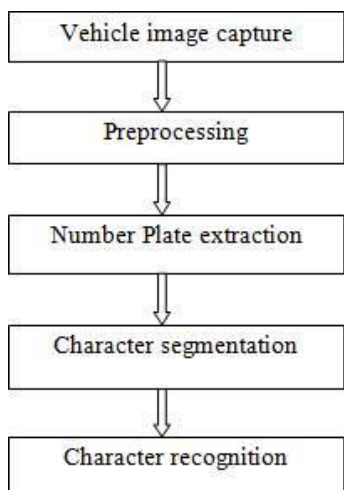


Fig: 1.1 Block diagram of ANPR system

PROPOSEDSYSTEM

This paper proposes an automatic method to discover the principal characters in the license plate. To overcome the drawbacks in the existing system, an efficient approach for ANPR in which the input vehicle image is pre-processed firstly by iterative bilateral filtering, AHE and number plate is extracted from pre-processed vehicle image using morphological operations, image linearization/ thresholding, sobel vertical edge detection and by boundary box analysis. Sometimes the extracted plate area also contains noise, bolts, frames etc. The character segmentation is done by connected component analysis and boundary box analysis and finally in the character recognition phase, the characters are recognized by matching with the template database using correlation and output results are displayed. This approach works well for low contrast, blurred, noisy as well as for dark and light/bright category images.

IMAGE ACQUISITION AND PRE-PROCESSING

- Image Capturing
- Loading Image from file
- Gray scale conversion
- Iterative Bilateral Filtering
- Adaptive Histogram Equalization

NUMBER PLATE EXTRACTION

- Prewitt Edge detection

CHARACTER SEGMENTATION

- Connected Component Analysis
- Boundary Box Analysis

CHARACTER RECOGNITION

- Template Matching

IMAGE CAPTURING

The first step is the capturing of an image using electronic devices such as optical (digital/video) camera, webcam etc., can be used to capture the acquired images. For this project, pre-captured image will be taken.



Fig: 1.2 Captured image by digital camera

LOADING IMAGE FROM FILE

imread() function is used to call the images from the folder or from any location of the PC into the Matlab.

GRAY SCALE

It involves a conversion of color image into Gray image. The method is based on different color transform. According to the R, G, B value in the image, it calculates the value of gray value, and obtains the Gray image at the same time. rgb2gray() - This command is used to convert the RGB image into Gray-scale format.



Fig: 1.3 converted from color image to gray image



Fig 1.4 Pre-Processed image

ITERATIVE BILATERAL FILTERING

In the proposed method, Iterative bilateral filter is used for noise removal. Iterative bilateral filter is non- linear filter. It provides the mechanism for noise reduction while preserving edges more effectively than median filter.

ADAPTIVE HISTOGRAM EQUALIZATION

Contrast Enhancement using Adaptive Histogram Equalization: Contrast is defined as difference between lowest and highest intensity level. Histogram equalization is a method for spreading the histogram of pixels level more effectively. Adaptive histogram equalization shows better contrast than histogram equalization.

PREWITT EDGE DETECTION

The prewitt edge filter is use to detect edges based applying a horizontal and verticle filter in sequence. Both filters are applied to the image and summed to form the final result. The two filters are basic convolution filters of the form: Horizontal Filter, Verticle Filter.



Fig: 1.5 Vehicle Number Plate Extraction

CONNECTED COMPONENT ANALYSIS

Technique that scans and labels the pixels of a binarized image into components based on pixel connectivity. Each pixel is labeled with a value depending on the component to which it was assigned. The connected components are then analyzed to filter out long and wide components and only left the components according to the defined values.

BOUNDARY BOX ANALYSIS

Bounding boxes are imaginary boxes that are around objects that are being checked for collision, like pedestrians on or close to the road. In digital image processing, the bounding box is merely the coordinates of the rectangular border that fully encloses a digital image when it is placed over a page, a canvas, a screen or other similar bi- dimensional background.



Fig: 1.6 character Segmentation

TEMPLATE MATCHING

Template Matching is a technique that compares portions of images against one another.



Fig: 1.7 Database of templates

CONCLUSION

In this paper, the automatic number plate recognition system using vehicle number plate is introduced. The system utilizes image processing techniques for recognizing the vehicle from the database stored in the computer by user. The system is actualized and executed in Matlab and performance is tried on genuine images. In the existing work, work has been done on cleared number plates. This method has an issue of blurred image is taken from separation. In proposed work novel systems has been proposed for denoising and for better

character recognition, connected component analysis and boundary box analysis are used to give an appropriate result.

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