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Number Plate Recognition by using open CV- Python

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ABSTRACT:- *License Plate Recognition was a computer system that recognizes any digital image automatically on the number plate. This system includes various operations such as taking pictures, localizing the number pad, truncating characters and OCR from alphanumeric characters. The main idea of this system is to design and develop effective image processing techniques and algorithms to localize the license plate in the captured image, to divide the characters from that number plate and to identify each character of the segment by using the Open Computer Vision Library. This has been implemented in K-NN algorithm and python programming language. Many applications can be implemented by using this system, such as security, highway speed detection, violation of light, identification of handwritten text, discovery of stolen cars, automatic fee collection systems.*

Keywords: **Open CV, K-NN algorithm, identifying the vehicle, number plate recognition, OCR optical character recognition.**

1. INTRODUCTION

People from different countries interact in a multicultural environment to develop solutions to never-ending problems for men. The Open Source section is a one of the outstanding contribution in the scientific world is Python. Computer vision in the Intel's research has been producing a fruit called Open Computer Vision (Open CV), which can support the development of computer vision [1].

At present, the use of vehicles is increasing throughout the country. All of these vehicles have a unique vehicle identification number as their main identifier. The ID is actually in the license number that refers to a legal license to participate in the public movement. Each vehicle in the world must have its own number plate that must be installed on its body (at least on the back). They need to

Identify the vehicles are increasing in parallel with the number of vehicles. This identification system helps with safety, automatic switching systems, highway speed detection, light detection, stolen vehicle detection, and human and non-human loss collection systems. The auto license plate recognizing system replaces the manual license plate number writing process in the computer system.

In order to obtain an appropriate personal recognition, the license plate identification technique consists of three main topics. They are, find the location of the panel of digital images, segmentation the characters from the pictures of the panel and the visual character Recognition [2]. The most dominant and basic step is to determined the exact location of the number plate in the captured image. The localization of a license plate has been recognized either by structural analysis and color analysis method. In the License panel area, unwanted spots are removed by parsing the connected component. ANPR is a collective control system that captures the vehicle image and identifies the license number. Some ANPR system applications are automatic traffic control and tracking system, highway toll collection / automatic parking systems, petrol station automation, flight time monitoring. These systems automate the process of identifying vehicle license number, making it fast, cost effective.

Figure 1.1: LPR

Figure 1.2: ANPR Processing

2. RELATED WORK

Searching for license plate recognition is still a challenge. It involves three major steps. They specify number pad space,

character segmentation, and character recognition. Each step suggested different ways to improve efficiency. One of these methods [1] used the adaptive threshold to highlight the characters and suppress the background. In order to remove unwanted image spaces, a component algorithm is first applied to the converted binary image from the original panel. A special algorithm called Image Scissoring is used to divide the Optical Character Recognition engine called tesseract, which returns ASCII to the license number. The entire system has been implemented using open CV.

Another method [2] is to deploy the forward background feed method for character classification. The neural network is developed by using the backward-propagation algorithm. Normalization, scale and edge detection are included in the steps of the preprocessing. The horizontal and vertical graph and component survey are able to address the problem of character fragmentation.

[3] Another way in which character areas are selected is through binarization, connected component analysis. The Point Analysis method removes unwanted points and combines split points and split points. This unit achieves a 97.2% accuracy rate in character segmentation. The reliability of the recognition was 90.9%.

[4] Offers an approach that relies on effective morphological operation and the detection method of Sobel Edge. This approach is simplified to divide all letters and numbers used in the number pad using the surround box method. After the template is fragmented, the matching policy is used to recognize numbers and characters. This whole system was implemented using MATLAB.

[5] Provides an overview of the analysis of related components and processes, such as aspect ratio analysis and pixel count analysis.

In [6] the author studies a comparison of four algorithms that are sequentially using statistical properties, the Hough Transform and Contour algorithm, the medium transformation approach and morphological processes and their results.

The handwritten text [7] is fragmented by the watershed algorithm. Noise removal, slope correction, budgeting and normalization were eliminated in pre-treatment. After fragmentation the process of extracting a segmented image is done by a reverse integer to convert the wavelet integer. The classification is then sorted by neuroscience.

3. MATLAB VS OPENCV

At present, open CV is a great dealing with the open source library for computer vision and has a large community of users. Open CV has much more functionality to see the computer than MATLAB [2]. Many of their functions are performed on the GPU. The library is updated continuously (a new version is released every 3 to 4 months). In general, the open CV C ++ program can be executed with a high speed than the MATLAB code. Open CV has more functions to see the computer than MATLAB. Many of their functions are performed on the GPU [3]. The C ++ Open CV code is usually run faster than the MATLAB code, but compared to open CV C ++, open CV is much better than C ++. Python is better and easier than other programming languages like C ++ in seeing the computer, we encounter similar options. What a tool you should learn Engineer / Programmer Computer vision – Open CV using C ++, or Open CV using Python, or MATLAB, as at present we have some options to choose from. In the past there were no good libraries to see the computer. We identified these studies by means of relevant books that were available and began coding the special library of special algorithms for computer vision[6]

Like MATLAB, Open CV is also made for image processing and used as an alternative tool and much faster than other simulations. Each function is designed in Open CV, the function structure and data using the image processing coding software. On the other hand we get nearly everything in the world in the form of toolboxes on Matlab. Although MATLAB is a relatively simple language, this high-level programming language has become slower in some cases. In such cases, open CV works better and produces accurate results. Similarly, it can be very simple to handle some code to model the idea of processing your images. One of the outstanding contributions of the Open Source community in the scientific world is Python.

3.1 OPENCV

Open Source Computer Vision Library is a common platform and set of programming functions for real-time applications [2]. The open CV library contains several algorithms for more than 500 optimized algorithms. Used mostly around the world, with forty thousand people in the user group. The first languages used in C-C ++ are mainly written in C, making them portable to certain platforms such as the digital signal processor. Now the language that is called Python is being used recently, has been developed to encourage adoption by a wider audience. These languages recent versions have interfaces for C ++. Open CV is a multi-platform library, containing C ++, Python, and Java interfaces. Open CV is designed to achieve computational efficiency with a strong focus on real-time applications.

For now; open CV supports many of the improved algorithms for computer vision and automated learning, which are spread daily [2]. Open CV currently supports a vast programming languages such as C ++, Python, Java and others, and is available on different platforms such as Windows, Linux, OS X, Android, iOS, and so on. Here in this system, we used Python as a code language. It is called Open CV Python. We choose the snake because it is easier to understand and more effective. The proposal combines the good qualities in Open CV and Python.

4. EXISTING METHOD:

In many countries ANPR methods have been implemented such as Australia, Korea and a few other countries [1]. In the development of ANPR system in many countries the number plate standards are strictly implemented. These systems use standard features for license plates such as: panel dimensions, panel borders, color and letter characters, etc., which help to easily localize the number pad and specify the car license number.

In India, plate number standards are rarely followed [2]. There are wide variations in font types, text, size, position, and colors of number plate. In a few cases, there are other undesirable decorations on the number panel. Also, different other countries, there are no special features on Indian number panel to facilitate recognition. Thus, only manual recording systems are currently being used and ANPR has not been commercially developed in India.

5. PROPOSED METHOD:

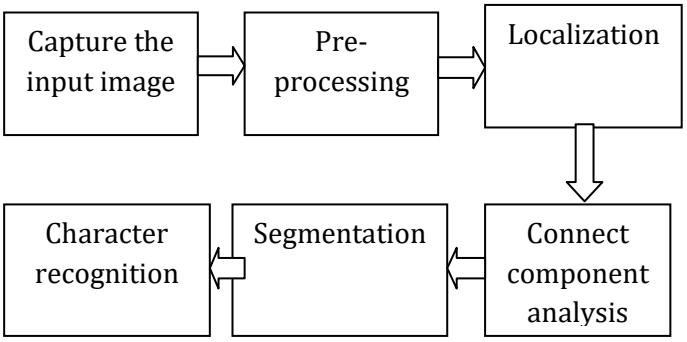

Figure (4) :block diagram of license plate

5.1CAPTUERE THE INPUT IMAGE:

The car's number pad is taken from a high resolution camera. The resolution of the number plate recognition system depends on the captured image. The image captured in RGB format must be converted to a gray image.

5.2 PRE-PROCESSING

Pre-processing is a set of algorithms applied to the image to improve the quality by which the gray image is converted to a binary image. Before converting to a binary image, the image is smoothed to reduce noise. Pre-processing can be done by the threshold algorithm. There is a different kind of threshold like

- Global threshold
- Adaptive mean threshold
- Adaptive Gaussian threshold

Global threshold: The threshold is a nonlinear process where two levels are assigned to pixels lower or bigger than the threshold value specified. The threshold value is constant. The grayscale picture is converted to convert the binary image according to the formula

Dst (x, y)= {max value if src(x,y)>T(x,y)

0 otherwise

Where T (x, y) is the threshold calculated individually for each pixel. Average adaptive threshold: The value of the threshold is the average area of the neighborhood. Gaussian Adaptive Threshold: Threshold value is the sum of the values of the values of the neighborhood where the weights are a Gaussian window. The gray picture is then converted to a binary picture by the adaptive threshold method. The threshold is the simplest way to divide objects from the background. If the background is relatively same, the global threshold can be used. For large change in background intensity the adaptive threshold is used.

5.3 NUMBER PLATE LOCALIZATION

The license plate is extracted using either a shape analysis or a color analysis method. In the General License Panel has in form of a rectangular shape. Thus, algorithms look for geometrical shapes of a rectangular proportion. In India, most license plates are white or yellow, and therefore can also use color analysis. Before you find the rectangle in an image, the image must be in a binary image or the edges of the image should be detected. Then you should find and connect to the relevant rectangular corners. Finally, the areas connected to the box are connected and all rectangular areas of interest are extracted.

5.4 CONNECT COMPONENT ANALYSIS

To remove the unwanted image space, the algorithm of the component connected to the binary filter is applied first. The parsing of the connected component is done to determine the characters in the image. The basic proposal is to pass through the image and find a connected pixel. Each component (dots) is distinguished and extracted.

5.5 SEGMENTATION

Once the license plate has been extracted, each character must be fragmented. For component division, the component label is used to see the computer in order to discover the connected areas in binary digital images. The label of connected components works by scanning a pixel-in-pixel image from top to down to find connected pixels and connected pixel cards.

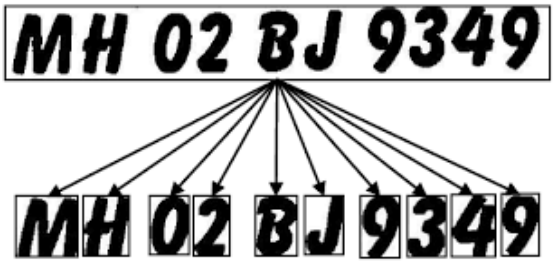

Figure (5): character segmentation

5.6 CHARACTER RECOGNITION

To identify characters, the segmented characters in the license panel must match the templates that are already created. The recognition process returns the license number in ASCII format and saves it in a text document. In this recognition is a two-track process. In the first pass, an attempt was made to identify each word in turn. Each satisfactory word is passed to the adaptive workbook as training data. The adaptive workbook gets an opportunity to learn the text more accurately.

6. ALGORITHM PROCEDURE

1: Begin

2: Input: Original Image

3: Output: Characters

4: Method: K-Nearest Neighbors

5: LP: License Plate

6: Convert RGB image to Grayscale

7: Filter Morphological Transformation

8: Transforms Grayscale image to binary image

9: Filter Gaussian for Blurs image

10: Finding all contours in image

11: Search & recognize all possible character in image

12: Crop part of image with highest candidate LP

13: Crop the LP from original image

14: Apply steps from 6 to 11 again on crop image

15: Print the characters in LP

16: End

7. RESULTS:

Figure [1] Input image

Figure [2] RGB to grayscale image

Figure [3] morphological operations

Figure [4] gray to binary

Figure [5] finding all contours and blobs in the image

Figure [6] output of contour image

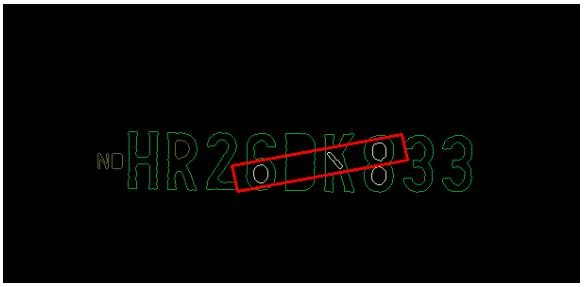

Figure [7] cropped the image

Figure [8] RGB to gray [apply the steps from 6 to 8]

Figure [9] morphological operations

Figure [10] finding all contours and blobs

Figure [11] output of the contours

Figure [12] character recognizing

Figure [13] final output

8. Conclusion

Scanning number plate sometimes goes unsuccessful by using the shape analysis method to detect exact area of the plate. Future extension of this work is to develop character recognition using template matching algorithm. Detecting number plate characters during night times work efficient but it gets inefficient in case of sunny time

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