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Foggy Image Clearance and Vehicle Number Plate Identification using Python

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Abstract: Number plate detection algorithm is mainly categorized into three classes: edge- based, colour based and texture based. License plate location algorithm based on edge detection and morphology are describe to locate the number plate, first identify whether any noise is present in the plate. In the field of computer and machine vision, haze and fog lead to image degradation through various degradation mechanisms including but not limited to contrast attenuation, blurring and pixel distortions. This limits the efficiency of machine vision systems such as video surveillance, target tracking and recognition. Various single image dark channel dehazing algorithms have aimed to tackle the problem of image hazing in a fast and efficient manner. Such algorithms rely upon the dark channel prior theory towards the estimation of the atmospheric light which offers itself as a crucial parameter towards dehazing. This paper describes the use of sobel technique and image morphing for number plate detection and ocr technique is used to extract the number of the vehicle

Keywords: Vehicle number plate, sobel, dehazing, image morphing, ocr

I. Introduction:

Vehicle Number Plate Identification (VNPI) is a part of digital image processing which is generally used in vehicle transportation system to categorize the vehicle. Number plate recognition systems are having varieties of application such as traffic maintenances, tracing stolen cars, automatic electronic Toll collection system etc. But the main aim is to control the traffic management system. In India the traffic management system is developing day by day. In India, the number plate containing white background with black foreground color is used for private cars and for the commercial vehicles yellow is used as background and black as foreground color.Locating the number plate is very stimulating work in the field of image processing. The whole system mainly consists of two stages. First to identify the position of the number plate from the particular vehicle and second segmentation of all the numbers and letters of the number plate. The identification task is interesting because of the nature of the light. The position error will increase if the color of the number plate is related to the background. Noise on the number plate can sometimes cause error and low accuracy. There are some limitations that lead to failure in most practical applications due tothe diversity of the number plate characteristics and the intricacy of the natural environment like rain, snow, for etc. we anticipated a method mainly based on edge detection and morphological operation and decrease the noise using mid-filtering noise removal method.

II. Proposed Method:

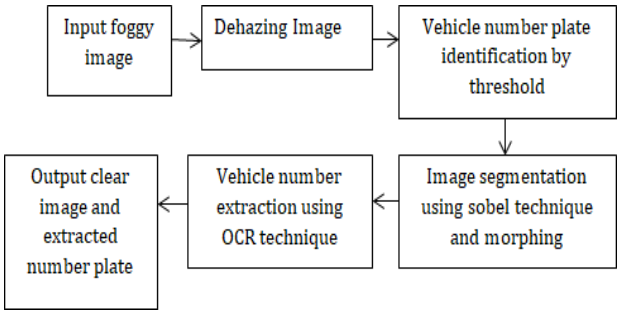

Figure 2.1: Proposed method

In this proposed methodology the foggy input image is given to the python IDE for image

processing. The foggy image is dehazed. Ones the dehazed image is extracted further sobel technique and image morphing is applied to extract the vehicle number plate. The ocr technique is applied to detect the number of the vehicle number plate and even and odd numner detection is done and displayed.

Image processing: Image processing is a technique for converting an image into digital form and performing operations, in order to get some useful information from it. It is a type of signal dispensation in which input is image or video frame and output may be image or characteristics associated with that image. Usually image processing system includes treating images as two dimensional signals then applying already set signal processing methods to them.

Optical character recognition (**OCR**): is the electronic or mechanical conversion
of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image).

Image dehazing: Hazy condition will lead to blurring of the image and hence we may get incorrect number while detecting the registration plate. This may lead to serious issue like arresting or giving fine to the wrong person. So a dehazing algorithm is used to remove this haze. Here we have used thresholding, sobel and image morphing techniques.

Sobel edge detection: Sobel Edge Detection Sobel edge detector computes the partial derivatives in gradient which may be approximated in digital images. Typically it is used to find the approximate absolute gradient magnitude at each point in an input grayscale image. The sobel edge detection technique is based on horizontal and vertical convolution of the image. Sobel edge detector is very sensitive to noiseThe sobel edge detector consists of pair of 3×3 convolution kernels as shown in the figure 2.2. In sobel edge detector, one kernel is rotated the other by 90°.The gradient magnitude is given by:

-1	0	+1
-2	0	+2
-1	0	+1

G_x

+1	+2	+1
0	0	0
-1	-2	-1

G_y

Figure 2.2 masks used by the sobel operator

These two kernels can be applied individually to the input image. It produces separate measurements of the gradient component in each orientation. These two kernals are denoted by Gx and Gy. These can be combined together to find the absolute magnitude of the gradient at each point and also the orientation of that gradient.

The gradient magnitude is given by:

$|G|=(Gx^2+Gy^2)^2$ ..... (1)

An approximate magnitude is given by:

$|G|=|Gx|+|Gy|$ ..... (2)

The laplacian method searches for zero crossing in the second derivative of the image to find edges. The laplacian of 2-D function f(x,y) is a second order derivative defined as

$\nabla^2 f = (d^2f/dx^2) + (d^2f/dy^2)$ ..... (3)

The Laplacian is a 2-D isotropic measure of the second spatial derivative of an image. The Laplacian of an image highlights regions of rapid intensity change and is therefore often used for edge detection. The Laplacian is usually combined with smoothing as a precursor to finding edges viazero-crossings.
The 2-D Gaussian function is

$h(x,y) = -e^{(x^2+y^2)/2\sigma^2}$ ..... (4)

Where σ is the standard deviation, blurs the image with the degree of blurring being determined by the value of σ. The laplacian ofh is as follows:

$$\nabla^2 h(x,y) = -[(x^2+y^2 - 2\sigma^2)/\sigma^4]*e^{-x^2/2\sigma^2} \quad (5)$$

Morphing: Morphing can be defined as an animated transformation of one image into another image. Morphing involves image processing techniques like warping and cross dissolving. Cross dissolving means that one image fades to another image using linear interpolation.In the early 1990s computer techniques that often produced more convincing results began to be widely used. These involved distorting one image at the same time that it faded into another through marking corresponding points and vectors on the "before" and "after" images used in the morph. For example, one would morph one face into another by marking key points on the first face, such as the contour of the nose or location of an eye, and mark where these same points existed on the second face. The computer would then distort the first face to have the shape of the second face at the same time that it faded the two faces. To compute the transformation of image coordinates required for the distortion, the algorithm of Beier and Neely can be used.

III. Result:

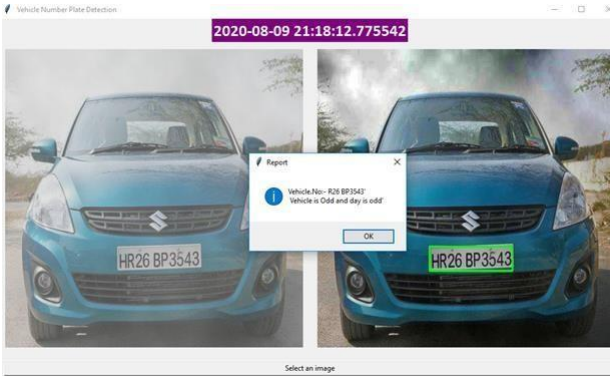

Figure 3.1: Result of dehaze number plate

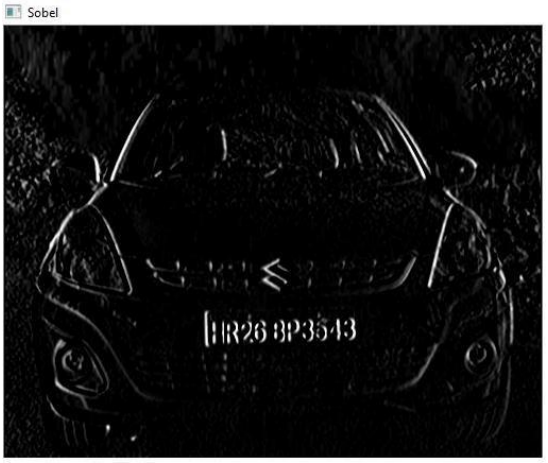

Figure 3.2: Imageprocessing using sobeltechnique

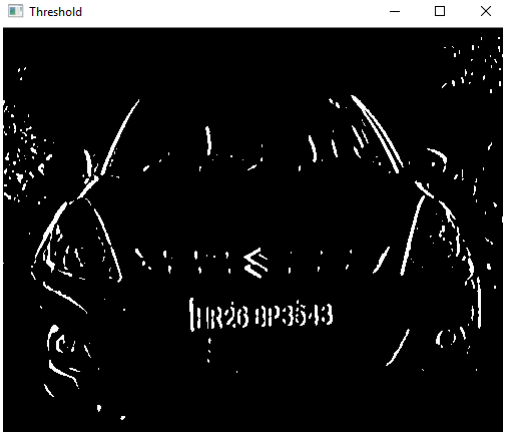

Figure 3.3: Thresholding the given image

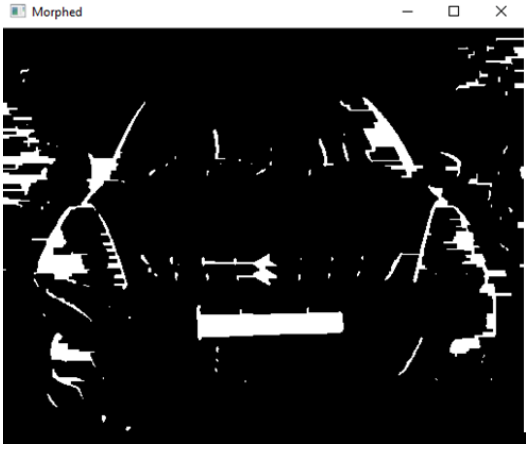

Figure 3.4: Morphed the image to extract the number plate

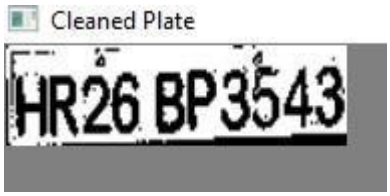

Figure 3.5: Extracted number plate

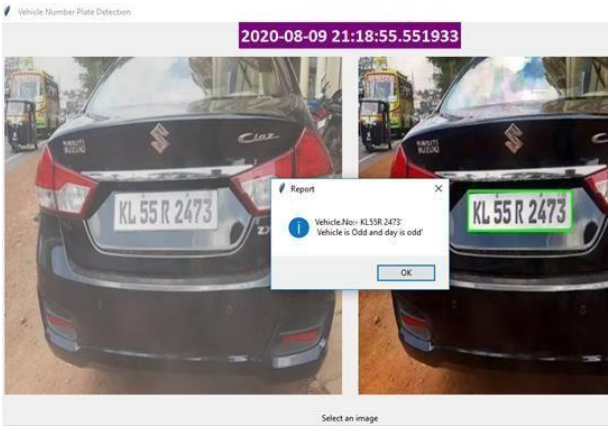

Figure 3.6: Result of dehaze number plate

Figure 3.7: Imageprocessing using sobel technique

Figure 3.8: Thresholding the given image

Figure 3.9: Morphed the image toextract the number plate

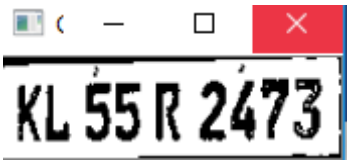

Figure 3.10: Extracted number plate

Conclusion:

A very efficient method for the recognition of the dynamic vehicle registration is proposed and the results were analysed. De fogging of image is done.This paper successfully implements the dehazing the foggy image using image processing with sobel technique, imahethreshholding and image morphing for vehicle number plate extraction. With theocr technique to extract the number from the vehicle number plate and finding the odd and even number. Since Edge detection is one of the most important techniques that have been commonly implemented in image processing. It is used in imagesegmentation, registration and identification of image processing.A composite image is treated as a metamorphosis of selected regions in several input images. The regions seamlessly blend together with respect to geometry and colour.An algorithm for vehicle number plate extraction, character segmentation and recognition is present. Database consists of images with different size, background, illumination, camera angle, distance etc. The

experimental results show that number plates are extracted faithfully. The performance of algorithms for license plate extraction, segmentation & recognition is acceptable range. The developed algorithms accurately extract and recognize in different location of the Indian license plate. The number plate is extracted and even-odd has also been checked.

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