VEHICLE NUMBER PLATE RECOGNITION SYSTEM

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***Abstract*—**This reportpresents the Number Platedetection extraction, character segmentation and recognition for vehicles like car etc. the use of vehicles in our life is rising exponentially and as increasing vehicles rules of traffic, theft of vehicles, ingoing to restricted areas, abnormal number of accidents lead to upturn in the crime rates linearly.Traffic control and vehicle owner identification has become major problem in each country. Sometimes it becomesvery difficult to identify the vehicle owner who violates the traffic A rules and drives too far fast. Therefore, it is not possible to pick up and punish those kinds of people because the traffic personal might not be capable to retrieve vehicle number from the moving vehicle because of the speed of the vehicle. Therefore, there is a need to develop A Number Plate Recognition system as a one of the solutions to this problem. Our main goal(aim) is that to control the traffic management system.

Keywords*—Vehicle number plate; Number plate extraction; character segmentation; character recognition; Segmentation; Noise removal.*

I. INTRODUCTION

The Vehicle number plate recognition (VNPR) system is an digital image processing techniques which mostly used in vehicle transportation system to identify the vehicle. for e.g. traffic managements, traffic controller, tracing stolen cars, automatic electronic toll collection system and other applications. this system is capable to identify the vehicles by extracting the number plate and reading the plate of identity which unique code identification given to each vehicle, but the main goal is that to control the traffic management system. It is an advanced machine vision technology used to identify the vehicles by their number plates without direct human.For the standard number plate, this system is easier to read and recognized. In the task becomes much difficult due to different in plate model.Most of the number plate detection algorithms is in more than one category based on variuos techniques. To Recognizethe vehicle number plate following factors:

Plate size:It can be of different kind of size in a vehicle image.

Plate location: a plate location can be located to the anywhere in the vehicle.

Plate background: It can have different background colors depends on vehicle. Screw: A plate should may have screw andalso that could be considered as a character.A number plate can be extracted by using the image segmentation. there are image segmentation methods available in various literatures formation. Some of the plate segmentation algorithms are depends on there color segmentation. A study of number plate location based on color segmentation is discussed in [1].In India, basically two types of number plates are used: - 1) white background with black letters on plate. 2) Yellow background with black letters on plate. Over the past few day years, researchers have developed many techniques to detect vehicle license plate but still it remains a challenging task. Vehicle identification approach can be classified into in 4 main steps such as; pre-processing, number plate region extraction, characters segmentation and each character recognition in the licensed number plate. Every level has its own importance in order to recognize the vehicle, when license plate images are tilted and characters are disable or broken which makes the segmentation of each character and recognition very tedious. Number plate detection system searches an input image in order to identify the specific features that contain the number plate. The number plate can be found anywhere within an image, it is impractical to check all the pixels of the image in order to located the number of plate. Therefore, we only the focus on those pixels that have the number plate.

II. BILATERAL FILTERING IMAGE

Filtering is the most important fundamental operation of image processing and computer vision. In the broadest sense of the term "filtering", the value of the filtered image at a given location is a function of values of the input image in a small neighborhood of the same location. For example, the Gaussian low-pass filtering can be computes a weighted average of pixel values in the neighborhood, in which the weights decrease with different from of the neighborhood. All formal and quantitative explanations of this weight fall-off can be given, the intuition is that images typically vary slowly over space, so near pixels are likely to have same values, and it is therefore appropriate to average them together. The unwanted values that put it on these nearby pixels are mutually less correlated than the signal values, so noise is averaged away while signal is preserved. The assumption of slow spatial variations fails at edges, which are consequently blurred by linear low-pass filtering[2].For black-and-white images, intensities between any two gray levels are still gray levels. As a sequence, when smoothing black-and-white images with a standard low-pass filter, intermediate should the levels of gray are produced across edges, there should producing blurred images. The color images, is an additional difficulties arises from the fact that between any two colors there are other, often rather different colors. For instance, between blue and red there are

various shadeslike pink and purple etc. Thus, the separating of the color bands may be produced when smoothing across color edges. The smoothed image does not just look blurred, it also exhibits odd-looking, colored auras around the objects.

III. GRAY SCALE CONVERSION

The captured input image is that Red, Green, Blue (RGB) format. The first step of preprocessing it and to convert RGB image into gray scale. The basic purpose of the applying color conversion is that to reduce the number of colors. The R,G and B components are separated from 24-bit color value of each pixel (i, j) and 8-bit gray value is calculated [3]. The Conversion of RGB image to Gray sale image by taking the weighted average of RGB value then, New grayscale image. For example: by using the standerrule:Grayscale=(R+G+B/3).In photography,computi ng,"Traffic control and vehicle owner detection has become major problem in every country. "colorimetry, a gray scale or grey scale image is one which value of the each pixel is a single sampled should be representing an amount of light, i.e. it carries only intensity information. Images of this sort, also known as black-and white or gray monochrome, are composed exclusively of shades of gray color images. The contrast ranges from black at the weakest i.e considering the value of zero and intensity to white at the strongest which is considering the value of one [4].

In this paper, the first various vehicle images have been acquired through digital camera, then input color image is converted to gray scale image, brightness adjustment, contrast up to optimum level of values and neglecting noise using median filtering is can be done in order to get better quality of image.

Original image

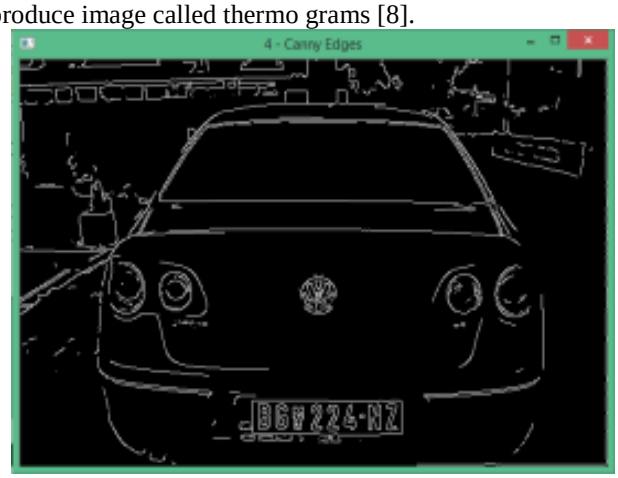
Grayscale conversion

Bilatral filter

IV. EDGE DETECTION

Edge detection is fundamental part for feature detection or feature extraction. In general case the solution of applying edge detection of algorithm is an object boundary with connected curves. It becomes very hard to apply this method to complex images as it might result with object boundary. Different edge detection operators such as Canny, Canny-Deriche, Differential, Sobel, Prewitt and Roberts Cross are used for edge detection [5]. The strength of many image processing and computer vision problems depends on the spotting of the meaningful edges. Edge detection can be refers to the process of identifying and locating sharp discontinuities in an image [6]. Edge detection includes a variety of mathematical methods that aim at identifying points in a digital image at which the image can be brightness changes sharply or, more formally, has discontinuities. The points elaborated at which image brightness changes sharply are basically organized into a set of curved line segments termed of an edges. The problem can be of finding discontinuities in one-dimensional signals is known as step detection and the problem of finding signal discontinuities over time is known as change detection. Edge detection is a fundamental tool in image processing, machine vision and computer vision, particularly in the areas of feature detection and feature extraction [7]. To detect the edges, we must have knowledge about the infrared imaging or thermal imaging.

Thermal imaging is done to the analyze objects in the very bright with the help of black body radiation , to all the objects emit radiation above absolute zero temperature. With increase in temperature, emitted radiation will increase thus object appear to brighter and clearer then cooler object. Thermo graphic cameras detect radiation in IR range and produce image called thermo grams [8].



Canny Edges

Final image with NPD

V. CHARACTER RECOGNITION

The character recognition phase consists of two steps: 1) Character normalization and feature extraction, 2) Character classification using Support Vector Machine [9]. Character recognition is the process of detecting and recognizing the characters from input image and converting it into the meaningful text in ASCII (American Standard Code for Information Interchange) or other equivalent machine editable form [10].

A. Character Normalization

Segmented characters are very much variation in size. In this paper, all the characters are normalized to predefined the height (Vertical Length) in pixel. As the characters have always variable width (Horizontal Length), each character image is normalized to a size of 32 X 32, by image mapping technique.

B. Feature Extraction

The main aim of the feature vector is to define distinguishing features of the characters. Choosing the most relevant feature of each character can not only facilitate data visualization and data understanding, but also reduce the measurement, storage requirements, training and utilization time, particularly. normally, the center of the character image is determined. With respect to the centric, number of transitions along the axes, 0 to 1 and 1 to 0, up to the boundary of character are counted. Transitions are specified for axes with predetermined angles. When the input data to an algorithm is too large to be processed and it is suspected to the be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of the features (also named a feature vector). Determining a subset of the initial features are called feature selection [11]. Feature extraction involves is reducing the amount of resources required to describe a large set of the data. When performing analysis of the complex data one of the major problems stems from the number of variables involved. Analysis with a large number of the variables generally requires a large amount of the memory and computation power, also it may cause a classification algorithm to over fit to the training samples and generalize poorly to new samples. Feature extraction is a general term for methods of the constructing combinations of the variables to get around these problems while still describing the data with sufficient to their accuracy. Many machine learning practitioners believe in that properly optimized the feature extraction is the key to effective model construction [12].

C. Number Recognition

The car number plate detection consists of combination of 0 to 9 digits and alphabets of A to Z. All the digits and alphabets are assigned a class label. For multi-class classification, either one by one approach is used or one-against-all is preferred. In the proposed work recognition can be achieved using one-against-all approach [11]. The polynomial kernel is used for classification. The database consists of 250 images. 60 % of the data is used to for training and remaining 40% is used for testing.

VI. CONCLUSIONS

An algorithm for vehicle number plate extraction or detection, character segmentation and recognition is presented. Database of the image consists of the images with different size, background, illumination, camera angle, distance etc. The experimental results can be show that, the number of plates are extracted faithfully based on vertical edge detection and connected component algorithm, with the success rate of 85%.Character segmentation of phase using connected component analysis and vertical projection analysis works in well with the success rate of 80%. The success rate should be achieved for character recognition is 79.84%.

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