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Efficient Automobile License Plate Recognition Technique in Traffic System

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Abstract— One of the most important aspects of applying computer techniques towards intelligent transportation systems is License plate detection and recognition .Nowadays this computer science techniques are widely used in driver assistance system, lane inspection, traffic inspection, law enforcement and public safety's .One of the major problem faced in day to day traffic is the Red light Violation, by using the intelligent traffic system we will be able to track the License plate of the violated vehicle. Here the MATLAB image processing technique is used to identify the vehicle number plate, hence identify the vehicle and owner.

I. INTRODUCTION

License plate recognition is an important aspect in the field of intelligent transportation systems. It utilizes computer vision and pattern recognition technologies such as edge, corner or blob detection [1,2] . Intelligent transportation systems (ITS) are applications which are aimed to provide services to traffic management and hence provide much more safer and smarter way of transportation network. It enhances the productivity through the use of sensors, advanced communications and information processing technologies comprising a broad range of wireless, communications-based information and electronics. Once this system is integrated into the transportation system's infrastructure, and later into vehicles themselves, these technologies relieve congestion, improve safety and hence enhance productivity. Intelligent Transportation Systems (ITS) include diverse technologies ranging from

Information processing and communications to traffic control devices and electronics. One of the major application of ITS is in Red light violation detection.

The major causes of Traffic light violation could be due to driver's drowsiness, Impatience or due to drivers fatigue and hence causes accidents at junctions and disrupt the normal traffic. As part of law enforcement, Red light Violation Detection (RLVD) at various traffic signal intersections is important .The system shall be capable of capturing snapshot and video of violated vehicle with automatic number plate detection system.

The captured images by the camera have few factors which affect it adversely hence making the license plate identification difficult. They are listed below
Weather conditions
Lack of sufficient illumination and texture
Sufficient scene overlapping between frames
Vehicle movement

Main objective of Red Light Violation Detection System is improving the standard of safety on roads by prosecuting the drivers violating the traffic light. For this purpose the Red Light Violation Detection System (RLVDs) is installed across the junctions and the places where traffic light is installed. When a vehicle crosses a stop line during red signal, an alert is generated and the indexed video is archived for future evidence. The system takes input from traffic light and start capturing the instant vehicle violets the red light. License plate recognition system helps to generating evidence against red light runners.

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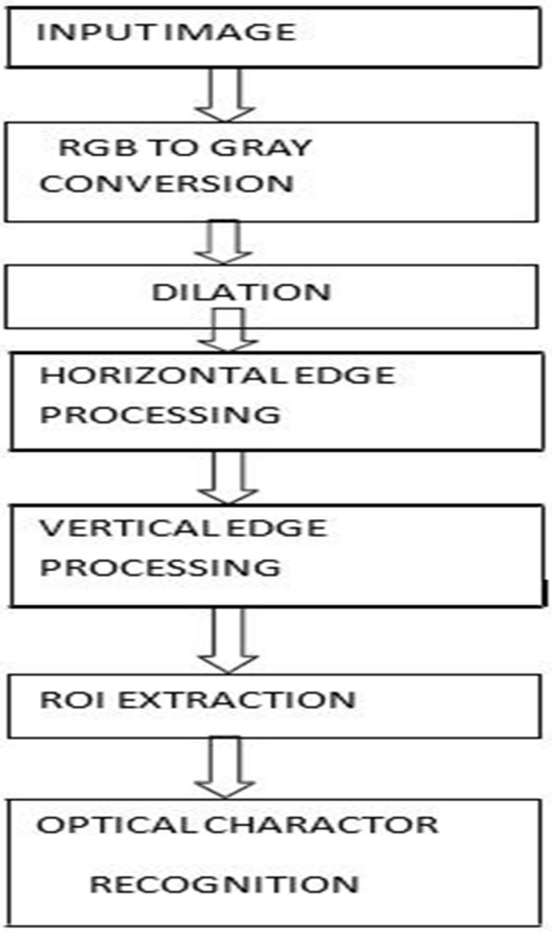

A. Intelligent Traffic System

The Red light Violation Detection System can be broadly classified into the following sub systems:

1) *Junction Industrial PC (Red Light Controller)*
2) *Communication Sub System*
3) *Application Software*

II. APPLICATION SOFTWARE

Application software will calculate the license plate of the vehicle by the following steps

A. Image Processing

The input image is initially processed to improve its quality and prepare it to next stages of described method. Color space of the image is changed to the YUV model but only the luminance is recorded. Later the picture is normalized with some threshold which helps to minimize the differences resulting from changing environmental conditions and increases the contrast between the characters and the background of the license plate shown in the picture

B. Localization of License Plate Using Joined Component Analysis

The first method of license plate localization is based on the joint components analysis. A set of elements (objects) which can be a set of license plate characters prepared in the binary image is localized. So initially the picture is threshold so that the license plate characters were represented in the picture in a color are identified in the labelling process to take part in a set of eliminating and grouping operations, which are to locate the license plate through a set of characters presented on it

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C. Dilate an Image

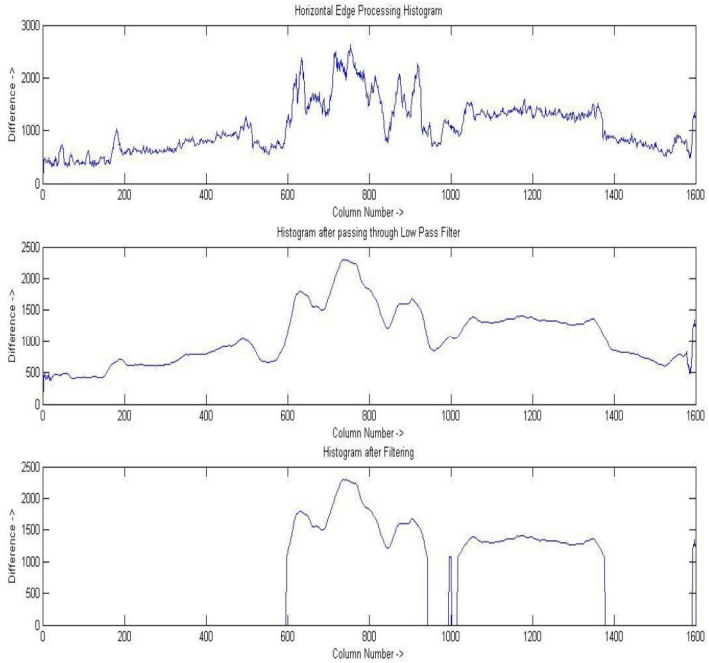
Using dilation, the noise with-in an image can also be removed. By making the edges sharper, the difference of gray value between neighbouring pixels at the edge of an object can be increased. This enhances the edge detection. In Number Plate Detection, the image of a car plate may not always contain the same brightness and shades. Therefore, the given image has to be converted from RGB to gray form. However, during this conversion, certain important parameters like difference in color, lighter edges of object, etc. may get lost. The process of dilation will help to nullify such losses.

III. DILATIONS

They are the most elementary operators of mathematical morphology. It is used in this process to reduce the noise. Erosion is a process by which a number of pixel is removed from the frame. If there is small dot or discrepancies as unwanted point's negligible pixel in a frame we can avoid this pixels by erosion frames. Dilation is a process it uses to bridging the gap. In the congested pixel there can be a gap after this background subtraction process that could disturb in counting vehicle. For the counting to be smooth, perfect dilation is mandatory. Both process comes in a series i.e. erosion and dilation. From diagram after erosion in fig 2 contains less noise then fig 2. After Erosion for perfect blobbing we do dilation, blobs is more accurate and well-shaped for counting.

FIG 2 Horizontal and Vertical Edge Processing of an Image

Histogram is a graph representing the values of a variable quantity over a given range. In this Number Plate Detection algorithm, the writer has used horizontal and vertical histogram, which represents the column-wise and row-wise histogram respectively. These histograms represent the sum of differences of gray values between neighbouring pixels of an image, column-wise and row-wise .In the above step, first the horizontal histogram is calculated.



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To find a horizontal histogram, the algorithm traverses through each column of an image. In each column, the algorithm starts with the second pixel from the top. Then, algorithm will move downwards to calculate the difference between the third and second pixels. So on, it moves until the end of a column and calculate the total sum of differences between neighboring pixels. At the end, an array containing the column wise sum is created. The same process is carried out to find the vertical histogram. In this case, rows are processed instead of columns.

A. Optical Character Recognition

The goal of Optical Character Recognition (OCR) is to classify optical patterns (often contained in a digital image) corresponding to alphanumeric or other characters. The process of OCR involves several steps including segmentation, feature extraction, and classification. Each of these steps is a field unto itself, and is done and implementation of MATLAB in OCR

B. Template Matching

Computer vision is a wide research field that aims at creating machines that see, not in the limited meaning that they are able to sense the world by optical means, but in the more general meaning that they are able to understand its perceivable structure. Template matching techniques, as now available, have proven to
be a very useful tool for this intelligent perception process and have led machines to superhuman performance in tasks such as face recognition Correlation is a measure of the degree to which two variables agree, not necessary in actual value but in general behaviour. Image is segmented by each character and by using template matching the actual character is printed as a text in a notepad.

C. RGB to Greyscales Conversion On Image.

An image in which the value of each pixel is a single sample is a greyscales image. That is, it carries only intensity information. They are called as black and white images. Grayscale images are easy to process as less image data is concerned, hence this conversion is required. The intensity of a pixel is expressed within a given range between a minimum and maximum, inclusive.

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IV. CONCLUSION

The Feature Extraction methodology adopted for character recognition has been able to provide very good accuracy for a wide range of font sizes and styles. The maximum accuracy obtained is 97%. The major factor hindering the improvement of accuracy is the similarity in character shapes and features of certain stylish characters. Angle of taking the image is very much important in optical character recognition. Further refinement of the system is possible by training the OCR Engine to work with artificial neural network.

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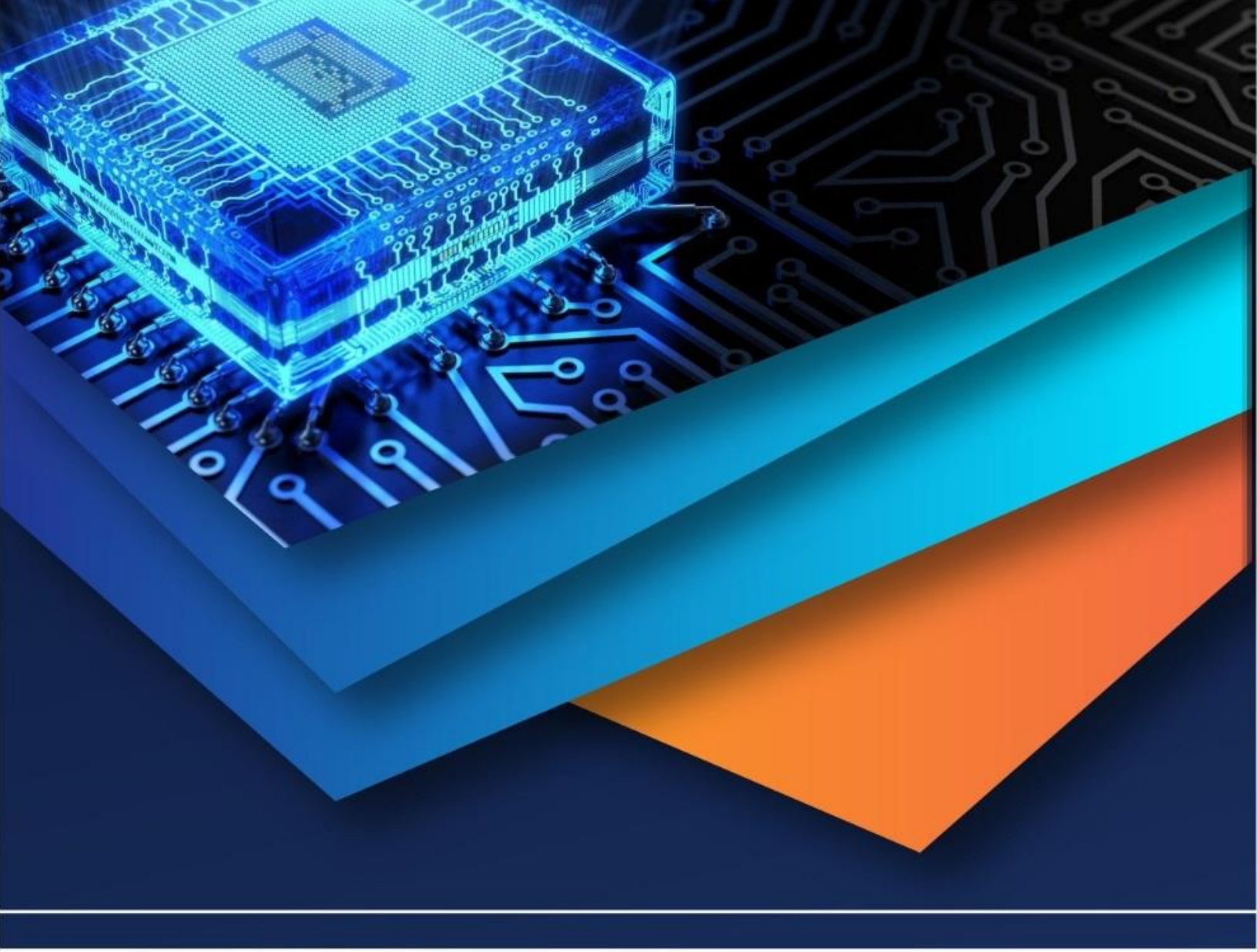

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