International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

A System for Vehicle Detection using Machine Learning

Suryam Sharma[1], Swapnil Nivangune[2]

[1, 2]Department of Computer Engineering, Sinhgad College of Engineering, Savitribai Phule Pune University,
S. No. 44/1, Vadgaon Budruk, Off. Sinhgad Road, Pune 411041, India

Abstract: ***During the last decade, developing countries such as India have been exhibiting a rapid increase in human population and vehicles, and lack of integrated traffic surveillance system to handle such an outburst of traffic. This has raised concerns in the areas of efficient traffic management and safety. The huge amount of data collected poses the threat of human error when tried to be analyzed and categorized using human power. This highlights the need for an integrated system that can analyze and identify the attributes of a vehicle. In our project, we have developed a system that recognizes a vehicle using its three major attributes viz. license plate number, brand name, and color.***

Keywords: Vehicle recognition, vehicle detection, traffic surveillance, image processing

1. Introduction

Automatic recognition of vehicle data has been one of the significant applications of the intelligent transport system (ITS). ITS plays a key role in smart city construction. On-road vehicle detection and feature recognition are the prerequisites of intelligent traffic.

With the development of computer vision and computing power, various on-road vehicle detection approaches are proposed. There are three kinds of approaches which are most commonly used: the first one is based on foreground/background (Fg/Bg) image segmentation where moving (foreground) objects are separated from static (background) objects using techniques like difference method and background subtraction; the second is optical flow computation of specific segments (moving clusters) in an image; the third is vehicle detection algorithms which are based on the Hough method or on Haar-like features. For real-time systems, the most suitable approach is the Fg/Bg image segmentation method because of its low computational demands [1].

In this paper, we have proposed an integrated system that can extract important attributes of a vehicle such as a license plate no, brand name and color using Machine Learning () and Image Processing by taking vehicle image as an input.

2. Proposed System

To build this system we have used vehicle images of fixed size and which were approximately taken from the same distance. The proposed system takes the image as an input to recognize the vehicle by finding its major attributes such as license plate number, brand name, and color.

In the following sub-segments, we have described the three modules of the system to find three vehicle attributes.

2.1 License Plate Recognition

It is important that we crop suitable size of images containing vehicle information and ensure that the License plate recognition involves vehicle images of approximately same size, whereby they are processed by a series of algorithms that are able to provide an alphanumeric conversion of the captured license plate image into a text entry.

The following figure illustrates various steps involved in the license plate recognition module.

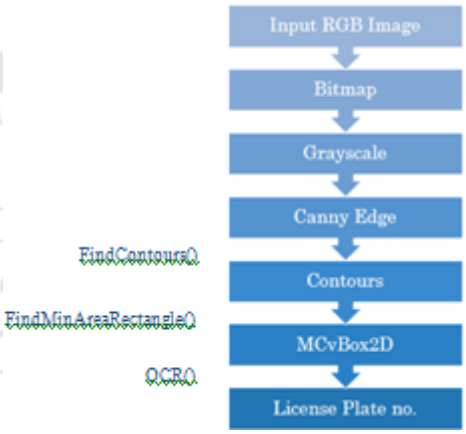

Figure 1: License Plate Recognition

The first three steps are pre-processing steps which converts the image from RGB domain to grayscale so as to eliminate the hue and saturation formation while retaining the luminance. We then apply Canny Edge detection which produces edges over text region and helps us to remove the remaining part of the image by applying filtering techniques. After Canny Edge we find contours, contours can be explained simply as a curve joining all the continuous points (along with the boundary), having same color or intensity. The contours are a useful tool for shape analysis and object detection and recognition. CVBox 2D stores the coordinates of a rotated rectangle (to align the ROI for OCR). Once we get the minimum area rectangle or the ROI (Region of

Interest) for the license plate. We then apply OCR (Optical Character Recognition) to get the license plate number. [2]

2.2 Brand Recognition

Once we get the license plate number, it is very easy to find the logo of the vehicle to get the brand name. The region above the license plate becomes the region of interest (ROI). We apply template matching to find the logo within that region.

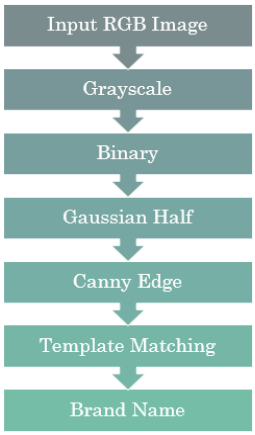

Figure 2: License Plate Recognition

The proposed method starts with reading an RGB image which is then converted it to grayscale. After that, the gray scale image is converted to a binary image. Subsequently, the binary image is resized to the half of the original size. This image is then again resized to its original size. It is followed by application of edge detection technique and then the matching process in immediate succession. The steps in the proposed framework are illustrated in figure (2). [3][4]

2.3 Color Recognition

After we get the logo we again find a new region of interest (ROI) situated just above the logo area. We then detect the vehicle's color using OpenCV HSV color detection method, in which we get the Hue-Saturation-Value of our ROI, and we compare that RGB value with our conditional cases for prominent vehicle colors.

3. Conclusion

The integrated approach that we have proposed in this paper gave the results as expected. The input images of cars are processed and the logos, number plates and colors are successfully recognized.

In future, the color detection part of the application can be optimized to get the precise colors.

References

[1] Kovai, Kristian, Edouard Ivanjko, and Hrvoje Gold. Real-time vehicle detection and tracking on multiple lanes. Proceedings of 22nd International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision WSCG. 2014

[2] Tran Duc Duan, Duong Anh Duc, Tran Le Hong Du, "Combining Hough Transform and Contour Algorithm for detecting Vehicles' Licence Plates" , Intelligent Multimedia, Video and Speech Processing. Proceedings of 2004 International Symposium on 20-22 Oct.2004 Pages(s):747-750, 2004

[3] R.M. Dufour ; E.L. Miller ; N.P. Galatsanos, Template matching based object recognition with unknown geometric parameters, Dec 2002, IEEE, INSPEC Accession Number: 7539398

[4] Esen, E. Soysal, M. Ates, T.K. Saracoglu, A. Aydin Alatan, A., A Fast Method For Animated TV Logo Detection, Content-Based Multimedia Indexing, June 2008, p 236.H.H.

Author Profile

Suryam Krishnakant Sharma is a final year under-grad student at Dept. of Computer Engineering, Sinhgad College of Engineering, Savitribai Phule Pune University.

Swapnil Nivangune is a final year under-grad student at Dept. of Computer Engineering, Sinhgad College of Engineering, Savitribai Phule Pune University.