International Journal of Advances in Scientific Research
ISSN: 2395-3616 (Online)
Journal DOI: 10.7439/ijasr
Review Article

Latest trend of variation of EDGE detection and object detection with pixel level variation and their comparison algorithms

Parul Mahajan and Bhubneshwar Sharma*

Department of Electronics and Communication Engineering, S.S.C.E.T, under Punjab technical university, India

***Correspondence Info:**
Er. Bhubneshwar Sharma
Assistant Professor,
Department of Electronics and Communication Engineering,
S.S.C.E.T, under Punjab technical university, India
E-mail: bhubnesh86@gmail.com

Abstract

The frequent traffic jams at major junctions call for an efficient traffic management system in place. The resulting wastage of time and increase in pollution levels can be eliminated on a city-wide scale by these systems. The image sequences from a camera are analyzed using various edge detection and object counting methods to obtain the most efficient technique. Subsequently, the number of vehicles at the intersection is evaluated and traffic is efficiently managed.

Keywords: Traffic monitoring, automatic lane finding, Object detection, Emergency vehicles, Image Processing.

1. Introduction

The application of image processing and computer vision techniques to the analysis of video sequences of traffic flow offers considerable improvements over the existing methods of traffic data collection and road traffic monitoring. Existing methods include the detectors such as loop, radar, infrared, ultrasonic, and microwave detectors which are expensive with limited capacity and involve installation, maintenance, and implementation difficulties. Image processing offer a relatively low installation cost with little traffic disruption during maintenance. Also they provide wide area monitoring allowing analysis of traffic flows and turning movements, speed measurement, multiple-point vehicle counts, vehicle classification and highway state assessment (e.g. congestion or incident detection). Image processing also finds extensive applications in the related field of autonomous vehicle guidance, mainly for determining the vehicle's relative position in the lane and for obstacle detection.

2. Automatic lane Finding

Automatic lane finding (ALF) is an important task for an adaptive traffic monitoring system. It enables applications in active vision systems, where the camera viewing angle and the focal length of the camera lens may be controlled by the system operator.

2.1 Lane region detection

This class relates the detection of the lane with the changing intensity distribution along the region of a lane. This class considers just the changes in the gray-scale values within an image sequence.

2.1.1 Color based segmentation

In this case, the features are defined by the spectral response of the illumination at the red, green and blue bands. At each pixel, the (R, G, B) value defines the feature vector and the classification can be performed directly on the (R, G, B) scatter diagram of the image.

Fig (1): Color Based Segmentation

2.1.2 Texture Based Segmentation

In this case, the texture of the image has been used as a feature for classification. The texture of the road is normally smoother than that of the environment. The texture calculation can be based on the amplitude.

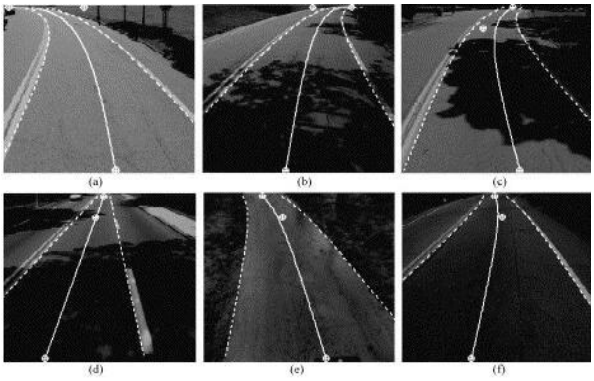

Fig (2): Texture Based Segmentation

3. Object Detection

Different approaches have been categorized according to the method used to isolate the object from the background on a single frame or a sequence of frames.

3.1 Thresholding

This is one of the simplest, but less effective techniques, which operates on still images. It is based on the notion that vehicles are compact objects having different intensity form their background. Thus by thresholding intensities in small regions we can separate the vehicle from the background. This approach depends heavily on the threshold used. Adaptive thresholding can be used to account for lighting changes.

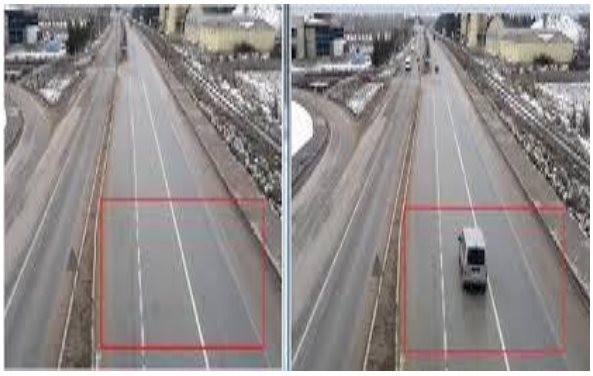

Fig (3): Object Detection Done Using Thresholding

3.2 EDGE-Based detection (spatial differentiation)

They can be applied to single images to detect the edge structure of even still vehicles. In traffic scenes, the results of an edge detector generally highlight vehicles as complex groups of edges, whereas road areas yield relatively low edge content. Thus the presence of vehicles may be detected by the edge complexity within the road area.

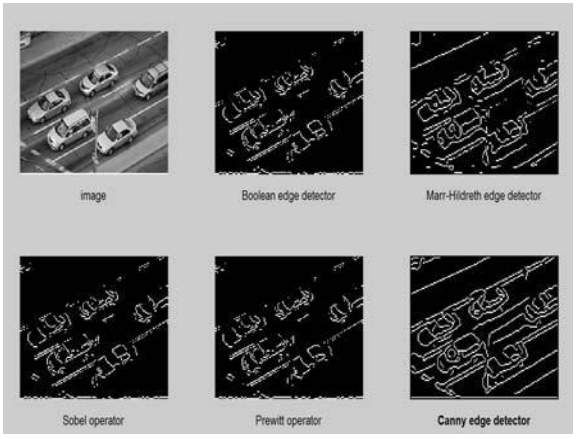

Fig (4): Object Detection Done Using Different Edge Detection Algorithm

3.3 Background frame differencing

The background image is specified either manually, by taking an image without vehicles, or is detected in real-time by forming a mathematical or exponential average of successive images. The detection is then achieved by means of subtracting the reference image from the current image. Thresholding is performed in order to obtain presence/absence information of an object in motion. The background can change significantly with shadows cast by buildings and clouds, or simply due to changes in lighting conditions. With these changing environmental conditions, the background frame is required to be updated regularly. In averaging, the background is built gradually by taking the average of the previous background with the current frame. In selective updating, the background is replaced by the current frame only at regions with no motion detected; where the difference between the current and the previous frames is smaller than a threshold. Selective updating can be performed in a more robust averaging form, where the stationary regions of the background are replaced by the average of the current frame and the previous background.

(a) Real-Time Image

(b) Background Image

(c) Subtracted Image

(d) No. of vehicles = 3

4. Emergency Vehicle detection

Fig (5): Emergency Vehicle Detection

5. Conclusion

Automatic lane detection based on region and texture. In object detection we have studied Thersholding, Background Subtraction, Boolean Edge Detector. Thus Emergency vehicle Detection can be well implementated using Edge Detector which tracks the red signal for more accurate detection.

References

[1] Kastrinaki V., Zervakis M., Kalaitzakis K. A survey of video processing techniques for traffic applications" Image and Vision Computing 21 (2003) 359–381. K.Compton, S.Hauck,

[2] Benjamin Coifmana, David Beymerb, Philip McLauchlanb, Jitendra Malikb"A real-time computer vision system for vehicle tracking and traffic surveillance" Journal of Artificial Intelligence Research 3 (1995) 325–348.Volume 6, Issue 4, August 1998, Pages 271–288..

[3] Stewart B.D., Reading I., Thomson M.S., Binnie T.D., Dickinson K.W., Wan C.L. Adaptive lane finding in road traffic image analysis, Proceedings of Seventh International Conference on Road Traffic Monitoring and Control, IEE, London (2003).

[4] Vikramaditya Dangi by, Amol Parab, Kshitij Pawar & S.S Rathod "Image processing based intelligent traffic controller", *Undergraduate Academic Research Journal* (UARJ), 2012; 1 (2): 2278 -1129.

[5] Fathy M. and Siyal M. Y. "A window-based image processing technique for quantitative and qualitative analysis of road traffic parameters"

[6] Xie M., Trassoudaine L., Alizon J., Gallice J., Road obstacle detection and tracking by an active and intelligent sensing strategy, Machine Vision and Applications 7 (1994) 165–177.

[7] Broggi A., Berte S., Vision-based road detection in automotive systems: a real-time expectation-driven approach, Journal of Artificial Intelligence Research 3 (1995) 325–348.

[8] Bertozzi M., Broggi A., GOLD: a parallel real-time stereo vision system for generic obstacle and lane detection, IEEE Transaction Image Processing 7 (1) (1998).

[9] Ahmed S. Salama, Bahaa K. Saleh, Mohamad M. Eassa, "Intelligent Cross Road Traffic Management System (ICRTMS)," 2nd Int. Conf. on Computer Technology and Development, Cairo, Nov 2010, pp. 27-31.

[10] Wu Y., Lian F., and Chang T., "Traffic monitoring and vehicle tracking using roadside camera," I*EEE Int. Conf. on Robotics and Automation, Taipei*, Oct 2006, pp. 4631-4636.