

# REVIEW OF DRIVER BEHAVIOR ANALYSIS TECHNIQUES WITH IMAGE PROCESSING

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**Abstract** - This paper represent the review of driver behavior with image processing. As we know that accidents are very serious problem nowadays. As the population increase the no of vehicles are also increases directly which leads to the traffic problem and bad driving problem. The people are not follow the driving rules and drive improperly which increase the accident ratio. Because of the driving pattern many people are killed or injured seriously. For every country safe driving is a major issue. It is very necessary to identify the driver behavior. In this paper author summarizes a review on various methods for detecting the driver behavior based on different research paper. Different author uses the different techniques for detecting the driver behavior. They use the videos capture form the camera installed at different lane for vehicle account. They get the live video from the camera at different traffic signal or other junctions.

**Key Words:** Image processing, lane detection, road traffic, driver behaviour, congestion.

## 1. INTRODUCTION

Increase number of accident has become very big problem in recent year. The reason behind the problem is increase the number of population and the number vehicle. In the big cities vehicles increases so rapidly which result the traffic congestion and accidents. Drivers are not follow the traffic rules and drive inappropriate which leads to the road accidents and killed thousands precious life. To safe human life it is very necessary to build the system which analyzes the driver behavior. This paper reviews the different techniques of detecting the driver behavior and develop the system which helps to decrees the accidents probability. In this paper the author discuss the algorithms for calculating the number vehicles on road using the image processing techniques. Some other techniques are use for lane detection and vehicle detection. The techniques based on image processing uses the camera images or videos installed at traffic signals and other points. Videos and frames are capture from the camera and process further for calculating the number of vehicle and lane.

The methods are summaries into five modules - Image acquisitions, vehicles detection, vehicles count , lane detection and driver behavior.

Image acquisition process is same in different methods. The vehicle detection algorithm divided into two segments. Author uses a algorithm which is based on different features

of image[1]. One of the author uses the local orientation coding (LOC)[5][6] and polygon approximation of contours [7] for object detection. The vehicle count algorithm use the morphological operation like erosion and dilation[2]. The methods like background subtraction, canny edge detection and Moore neighborhood algorithm use for vehicle count[3]. For lane detection one author purpose the Recursive Least Square (RLS) algorithm[1]. One of the author uses the Hough Transform algorithm for lane detection[4]. In the last part the driver behavior is calculate and get the result.



**Fig1.** Traffic congestion

This paper include the Related work which contain the review of the existing technologies. The section 3 include the comparative study of the algorithm and technologies. Section 4 describes the conclusion and the last part is the reference which are use in the paper.

## 2. RELATED WORK

There are many techniques for counting and detecting the vehicle. A CCTV camera is placed at highway and traffic signal for collecting the road and vehicle information .The images and videos are compare with the reference data for calculating the driver behavior. For the vehicle detection several methods like edge detection, background subtraction

and GMM . One of the methods reviewed in the paper recommend outline different vehicle detection techniques. Author used Background subtraction algorithm. In this foreground is vehicles and background is road, it gives the output better than optical flow method and frame differing method. The algorithm detected the vehicle in each four way road[9]. Image processing based system suggest the design for traffic control technologies with vehicle detection system using the canny edge detection algorithm [3].

Some author proposed the different edge detection techniques like Gradient based classical operators like Robert, Sobel , Prewitt operator and Laplacian based operators like canny detection[10]. Another author propose a method for detecting incidents form probe-cars data by identifying abnormal events that distinguish incidents form unpremeditated congestion[11].

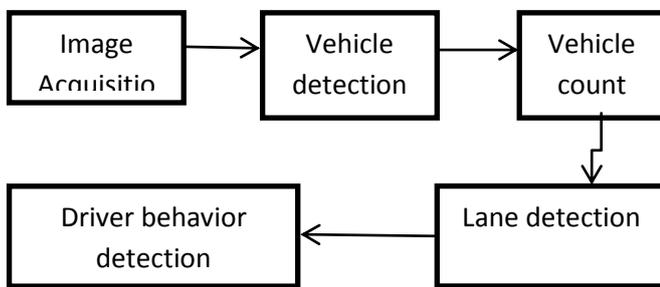


Fig 2. Architecture of driver behavior analysis.

For the lane detection author uses the method which is based on two features namely lane marking and road edge. With the features lane finding is divided into two classes[12], one of the method is based spectral response of illumination at the red, blue and green band. Another one is based on text based segmentation in this text of the image has been used for classification. Many author has been propose the algorithms for vehicle count[2][3][13]. In this author said that if the account of vehicle is high the time duration for traffic light is also kept high. Some methods also suggest the techniques based on day and night traffic conditions[14]. Review of existing system said that there are many image processing algorithms are present which overcome the old algorithm disadvantage. It show that we use many algorithm for vehicle count and for vehicle detection.

In the next section we get the information of comparative study of some image processing algorithm. Next section include the implementation information of the algorithm.

### 3. STUDY OF IMAGE PROCESSING ALGORITHM

Image processing converts image data into digital data in order to bring the information from the various processes in a computer. It process the input is an image like photograph or the video and convert the out as image , character or the parameter which is related to the image. The images or videos capture form the CCTV camera installed at highway or different junction need to be processed because the natural

images are raw images which contain so many unnecessary information that's why it need to process.

The architecture of driver behavior analysis can be as follow.

- Image Acquisition
- Vehicle Detection
- Vehicle Count
- Lane Detection
- Driver Behavior

The techniques use in different module are describe as follow.

#### 1. Image acquisition

The method describe in this review paper use the camera for image acquisition. The camera install at different area of junction , highway , traffic signal and polls capture the road or vehicle images and videos. The frames are extracted from the videos and the analyzed the for the vehicle detection and vehicle count.

#### 2. Vehicle Detection

For the vehicle detection the author implement two different segments of algorithm. The first segment of algorithm is the line segment calculation. In this the list pf potential vehicle is generate. The lateral vehicle border , expected height of the vehicle are determine. The lateral border of potential vehicle are find by the thresholding the signals. The second idea for detecting the vehicle position is the lane border estimate which is based on high level-knowledge. The algorithm is like: the lane is scanned from the lowest image row to a any vertical coordinate corresponds to maximum distance in the world. The vehicle position is obtained if a number of pixel in a row [1].

In the Local Orientation Code the raw gray scale image are preprocessed bt the method. The resulting image obtained is the bit of string which represent the binary code. The formula for the operator is define as:

$$b_0(n,m)=\sum_{k(i,j) \in \text{neighborhood}} P_{i,j} \cdot u(b(n,m) - b(n+i,m+j) - t(i,j)),$$

where  $b(n,m)$  denotes the (gray scale) input image,  $b_0(n,m)$  the output representation[5][6].

The polygon approximation of contours is robust and detect straight edges even when the pixel's locations are not straight because of natural noise at the objects. Straight edges are than used to report and classify contour's corners according to their angle and their adjacent segments lengths [7].

#### 3. Vehicle Count

For the vehicle count background subtraction techniques[2] is used. In this technique merging of two techniques is done,

motion detection and vehicle detection techniques are combine. In the motion detection two consecutive frames are taken in which histogram of key region of the frames are analyzed , and then histogram is compared with the determine threshold. In the vehicle detection road image is divided into subpart. In the canny edge detection [3] an adaptive background subtraction is used. The canny edge technique is used for the edge detection of the vehicle. Canny edge detector is effective method because it consider all the neighbor pixels. Moore neighborhood algorithm is used for object detection.

#### 4. Lane Detection

Recursive Least Square (RLS)[1] algorithms have a faster convergence speed and do not exhibit the eigenvalue spread problem. Lane departure warning and lane following are based on the vehicles position relative to the lane borders.

$$\partial V(t) = c_{0,R}(t) + c_{0,L}(t) / 2(c_{0,R}(t) - c_{0,L}(t))$$

L and R correspond to the vehicles inner left and right lane borders. The dynamics of  $\partial V(t)$  can be learned in order to operate a lane change warning system in consideration of the current driver's behaviour.

One of the author purpose the Hough Transformation[4] technique. Hough transformation (HT) maps a features of an input space to a set of parameters in an output space. The Hough Transformation follow , the following steps: 1) Detect edges to Identify the line separated over image. Binding the lines so that they do not get parallels (horizontal to axis). 2) Calculating the high peaks. 3) Identifying nonzero points in peaks. 4) Straightening the line and placing the point on the line. Join these points. 5) Super impose the point joins over the original image.

#### 5. Driver Behavior Detection

In the driver behavior section the information of all section are used. The first section images and videos are collected from the camera. The second section count all the vehicle on the road . In the third section different methods are used to count the vehicle and fourth section give the lane information all these information are collected and with the help of all information driver behavior is detected. This behavior of driver is used to control the road accident.

### 3. CONCLUSIONS

Traffic congestion and road accidents become a serious problem. Increasing number of vehicle leads to the traffic jam and killed human life. It is very necessary to control on the road accident the image processing play a very important role to find out the driving pattern behavior to reduce the road accidents. In this review paper author discussed different techniques to find out the driving behavior. The paper give the information about the different algorithms which is help full in detecting the vehicle. Some methods are

give the idea to account the vehicle which is help full to reduce the vehicle density in particular road. The paper also discus the algorithms for detecting the lane of vehicle. All the algorithms have some advantages and disadvantages according to our need we use these algorithms. The author presented the review on analysis of driver behavior which is very necessary for reducing the road accidents.

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