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Road Accidental Alert System Based On Lane Change Detection And Eye Blink Detection

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ABSTRACT: *Presently a day Car crashes are the indigenous issue in which 1.2 million individuals bite the dust and our (1 to 3) % GDP is spend on the restorative cost and property harm. To keep the general population from everyday mishaps one choice is to elongate the limit of driving framework by expanding the quantity of path miles and second choice is produced on-board car driver help frameworks.Accessional problem is Sleep related accidents tend to be more severe, possibly because of the high Speed involved and because the driver is unable to take any avoiding action, or even brake, former to the collision. Horne describes typical sleep related accidents as ones where the driver runs off the road or collides with another vehicle or an object, without any vestige of hard braking before the impact. Here by Using Image Processing providing Robust Real-time driver lane changes detection using Hough transform and eye blink detection using viola jones algorithm, the system shows good promise for incorporation into the next generation of intelligent transportation systems (ITS).*
KEYWORD: *Canny edge detector,Lane change detection, Face detection, Eye Blink detection, Alarm.*

I. INTRODUCTION

Image processing closely related to computer vision. PC vision is the development of emergent depiction of unmistakable and noticeable element from their picture. Picture division is the way toward parcelling of picture into its constituent segments and significant areas as indicated by their indistinguishable arrangement of properties or qualities. Division assume extensive part in motion acknowledgment.

The major cause of fatal accidents on the road is improper operations enforced by drivers that can be caused by sleeping, miss-judgments, drowsiness, or inattention to the surrounding vehicles. In order to allay the number of traffic accidents and to improve the driver's safety, lane departure warning (LDW) system has emerged as a promising tool. LDW system constantly monitors the position of a vehicle relative to road lane markings. When vehicle departs from its host lane, a warning is delivered to the driver[3]. Furthermore, languor of the drivers coming about because of taking calming prescriptions recklessly or tiredness and weariness of the drivers additionally add to street mishaps. It is in this manner essential to build up an observing framework inside the vehicle which can watch out for the soundness of the driver while driving and can alarm firstly the driver and, if there should be an event of nonresponsive driver, the law requirement experts about the state of the driver and nearness of a conceivable clumsy vehicle out and about. .This can bring about lessening the quantity of mishaps and can spare valuable lives and resources. In this paper, we have proposed and executed a framework which can recognize whether the driver is tired or not by observing the squinting example of his/her eyes and after that bring a capable of being heard caution up in the vehicle with an end goal to alarm the driver [1].

II. METHODOLOGY

A. *Back Propagation* [1]

The generalized delta rule,also known as back propagation algorithm is explained here briefly for feed forward Neural Network (NN). The explanation here is intended to give an outline of the process involved in back propagation algorithm.

The NN explained here contains three layers. These are input, hidden, and output Layers. During the training phase, the training data is fed into to the input layer. The data is propagated to the hidden layer and then to the output layer. This is called the forward pass of the back propagation algorithm. In forward pass, each node in hidden layer gets input from all the nodes from input layer, which are multiplied with appropriate weights and then summed. The output of the hidden node is the nonlinear transformation of this resulting sum. Similarly each node in output layer gets input from all the nodes from hidden layer, which are multiplied with appropriate weights and then summed. The output of this node is the non-linear transformation of the resulting sum.

B. *Binarization* [7]

Binarization is the process of converting a pixel image to a binary image. Now global days it's still emergent for things like digitalising text or segmentation.

The Binarization technique converts the grey scale image (0 up to 256 grey levels) in to black and white image (0 or 1). The result of OCR (Optical Character approbation) highly depends upon the Binarization. The high quality binarized image can give more correctness in character recognition as compared original image because turmoil is present in the original image [1]. In fact problem is that which Binarization algorithm is judicious for all images. The selection of most optimal Binarization algorithm is daedal, because different Binarization algorithm gives different action on different data sets.

C. Violajones [1]

This algorithm is developed for face detection. It is commonly enforced inOpenCV to detect the faces from printed image. Viola–Jones needs full view frontal upright faces. So, in order to apprehend a face, the face must point towards the camera and it should not be tilted to either side. It seems thatthese detainment could lower the algorithm's utility to a exact extent, but in practice these limits are quite acceptable

The characteristics of Viola–Jones algorithm which makes it an appropriate detection algorithm are:

Robust - very high detection rate (true-positive rate) & very low false-positive rate.
Real time - For practical applications at least 2 frames per second must be processed.
Face detection only (not recognition) - The goal is to distinguish faces from non-faces (detection is the first step in the recognition process).

The calculation has four phases:

i. Haar Highlight Determination
ii. Creating a Fundamental Picture
iii. Ada support Preparing
iv. Cascading Classifiers

The components amassed by the location system include the total of picture pixels inside rectangular territories. Thusly, they look to some frontier like Haar premise capacities, which have been used already in the domain of picture based question recognition.

1. Haar Highlights – Every single human face have some peculiarities. These similar peculiarities might be coordinated utilizing Haar Highlights.

A couple of properties formal to human countenances:

The eye area is darker than the upper-cheeks.

The nose connect locale is brighter than the eyes.

Creation of properties shaping facial elements:

Area and size: eyes, mouth, scaffold of nose

Esteem: situated slopes of pixel powers

The four components coordinated by this calculation are then looked for in the picture of a face.

Rectangle highlights:

Esteem = Σ (pixels in dark region) - Σ (pixels in white region)

Viola and Jones utilized two-rectangle highlights.

For instance: the distinction in irradiate between the white &black rectangles over a tract.

Each element is identified with a unique area in the sub-window.

2. The rectangular elements are assessed by a picture portrayal called the **vital picture** in brief time, which gives a evolve emergent speed advantage.

3. The speed with which elements might be assessed does not adequately make up for their number, be that as it may. For instance, in a standard 24x24 pixel sub-window, there are a sum of M=162,336 possible components, and it would be restrictively extravagant to assess them all when testing a picture. In this way, the question discovery mechanism utilizes a variation of the learning calculation **AdaBoost** to both select the best elements and to mobilize classifiers that utilization them. This calculation develops a "solid" classifier as a direct mix of weighted basic "frail" classifiers.

The vital picture at area (x, y), is the aggregate of the pixels above and to one side of (x, y),capacious.

4. In falling, each stage comprises of a solid classifier. So every one of the elements are consolidated into a few phases where each stage has certain number of elements. The employment of each stage is to decide if a given sub-window is certainly not a face or might be a face. A given sub-window is readily disposed of as not a face in the occurance that it bombs in any of the stages.

D. EuclideanDistance [3]

The Euclidean separation or Euclidean metric is the "conventional" (i.e. straight-line) separate between two focuses in Euclidean space. .With this separation, Euclidean space turns into a metric space. The concerned standard is known as the Euclidean standard. More bloomed writing alludes to the metric as Pythagorean metric.

E. HoughTransform [3]

The Hough change is a component disposition strategy utilized as a part of picture investigation, PC vision, and advanced picture preparing. The motivation behind the method is to develope flawed cases of articles inside a specific class of shapes by a voting technique.

The traditional Hough change was worried with the distinguishing adduction of lines in the picture, yet later the Hough change has been stretched out to recognizing places of discretionary shapes, most ordinarily circles or ovals. The Hough capacity is intended to recognize lines. The capacity utilizes the parametric portrayal of a line: rho = x*cos(theta) + y*sin(theta). The capacity emoluments rho, the separation from the starting point to the line along a vector opposite to the line, and theta, the edge in degrees between the x-pivot and this vector. The capacity likewise gives back the Standard Hough Change, H, which is a parameter space framework whose lines and segments relate to rho and theta values separately.

F. Canny()[6]

The watchful edge identification calculation was proposed to improve the edge discovery handle. Three critical criteria were thought about for this reason. The first and most critical standard was to distinguish all the vital edges in the source picture. This implies the objective was to bring down the blunder rate. .The second rule was that the edge focuses to be identified as close as conceivable to the genuine edge, likewise called as restriction. A third rule was not to have more than one reaction to a solitary edge. The initial two were not sufficiently critical to evacuate the likelihood of more than one reaction to an edge because of which the third one was executed.

III. PROPOSEDSYSTEM

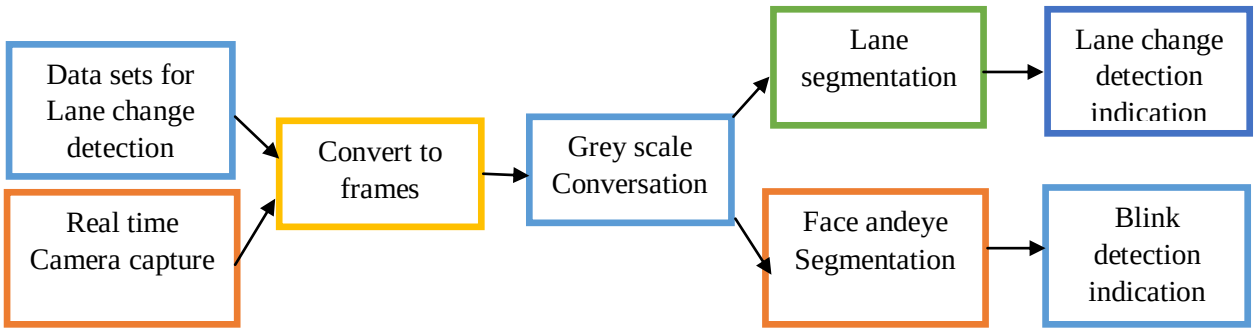


Fig 3.1 Proposed SystemBlock Diagram

Description:

Phase 1:

Data Set will be used for lane change detection. In this we will take some videos of lane change as data set in our system.

Camera-1 is used to take the real time image for eye blink detection.

Phase 2:

Video taken by the camera will be taken as input in this phase. Video will be broken into frames to proceed further. VideoFileReader() and step() is used to convert the video into frames.

Phase 3:

A grayscale computerized picture is a picture in which the estimation of every pixel is a solitary specimen, that is, it conveys just force data. Pictures of this sort, otherwise called high contrast, are made only out of shades of dark, shifting from dark at the weakest force to white at the most grounded. Grayscale pictures are regularly the aftereffect of measuring the force of light at every pixel in a solitary band of the electromagnetic range (e.g. infrared, noticeable light, bright, and so forth.), and in such cases they are monochromatic appropriate when just a given recurrence is caught. Grayscale picture discussion is critical for further strategy. rgb2gray() is utilized to change over the picture into dim.

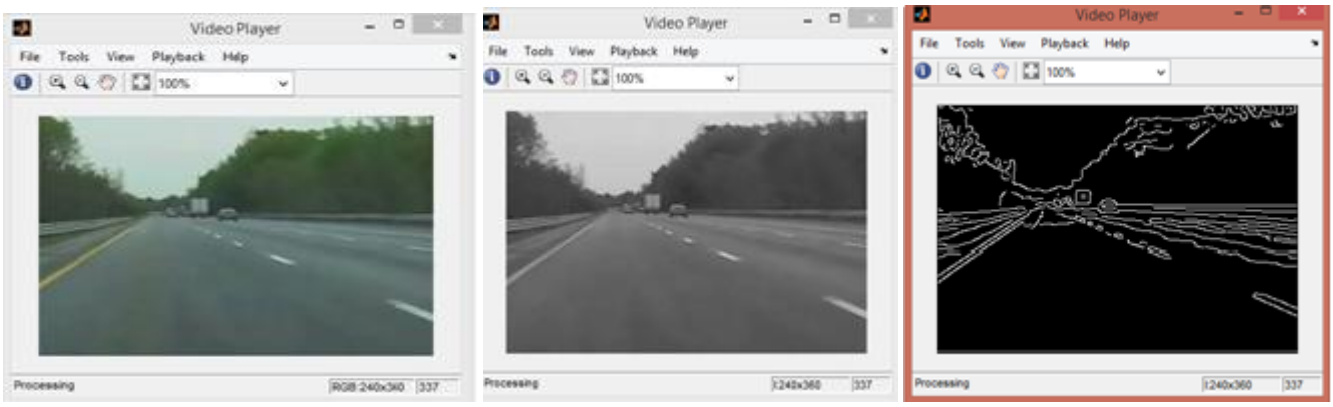
Phase 4:

Algorithms

1. .Edge discovery gives you the ideal unambiguous and shut limits you requirement for an immediate division. edge() utilizing vigilant. There will every now and again be spurious edges distinguished where they shouldn't be, and holes happen where there ought to be edges. The last issue of halfway edges needs some type of edge connecting to tie the accessible incomplete edges into a question limit. Edge recognizing of a picture fundamentally diminishes the measure of information and sift through pointless data while saving the essential basic properties of the picture.

2. .Lane examination is performed out and about locale to expel street pixels. Just path markings are the interests for the path identification prepare. Once the path limits are found, the conceivable edge pixels are checked to persistently get the path display.
3. Eye detection program is broken down into two stages: find the face, and then find the eyes. To find the face, two face finding algorithms are used: In the first algorithm we will use viola jones with HOG (Histogram Of Gradients). In the second algorithm we will use the same algorithm. For eyes detection we have two ways: rule based method and average eye matching.
   The rule-based method simply means the program tries to find two clusters of dark pixels (eyes are dark...) with some constraints applied to them. It takes too long and is highly error prone.
   The average eye matching, however, is extremely fast and gives accurate results, but user must supply the approximate ratio of the face size to the image size. This requirement renders this method less practical because ideally, user shouldn't tell the program anything other than the image itself.
4. By applying threshold using binary operation to an eye segmented region we can decide whether the eye is closed or not.

IV. EXPERIMENTAL RESULTS



a) Original Image b) Grey Scale Image c)Edge Detected

Fig: 4.1

Results:
(a) This image is the original image i.e. image is in RCB form.
(b) RCB image is converted into grey scale image.
(c) For further processing on lane detection video should be converted into grey scale image. Canny() gives maximum edge detected. So, Canny() is used.

2. Lane change detection

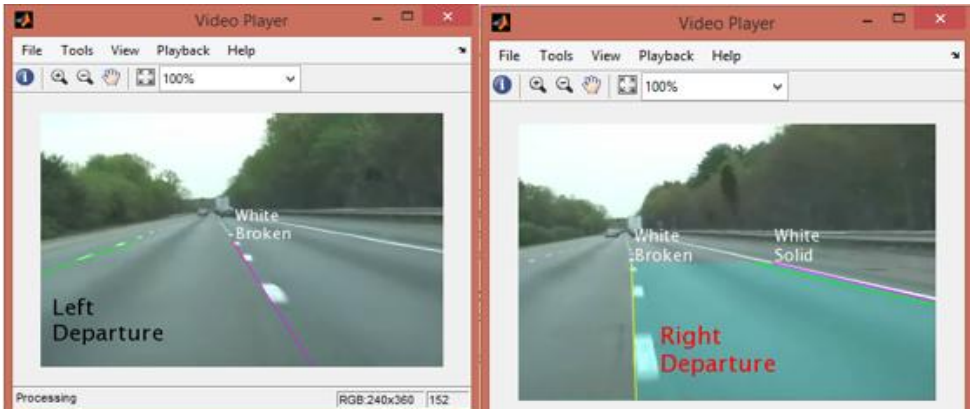


Fig: 4.2 Lane change detection

Results:
The above image shows the left and right departure of lane using Hough Transform.

3. Eye blink detection

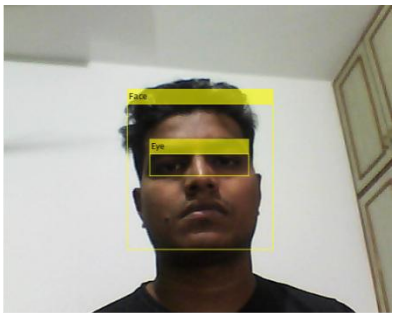


Fig:4.3

Results:Firstly the face is detected using the viola jones algorithm, then eyes are detected for eye blink detection.

V. COMPARISON OF METHODS

Table 1: Comparison of methods

Research Paper	Name	Method	Rate of Accuracy	Pros	Cons
[1]	Face detection	Viola –Jones	90.5%	It is very efficient algorithm for face detection in real time. This face detection technique is a successful method as it has a very low false positive rate.	Limited head poses.
[7]	Extraction of Eye features	Binarization	-	Utilizing estimations of 40-45 (Gaussian channel measurement), 12 (enlarging coefficient for distinguish the iris focus), 4 (widening coefficient for recognize the light and the student focus) and 0.03 individually 0.06 (rate esteem used to gather white pixels for the light zone, separately dark pixels for the understudy zone) we can state	

				that the calculation is a programmed one since we get great outcomes	
[1]		Back Propagation	96.7%	Very simple and efficient way to compute the gradient in a neural network and one can use it in conjunction with stochastic gradient descent which is also quite simple.	ANNs do not produce an explicit model even though new cases can be fed into it and new results obtained. ANNs lack explanation capabilities.
[3]	Lane detection	Hough Transform	98.46%	This can be exceptionally helpful when attempting to identify lines with short breaks in them because of commotion, or when items are incompletely block.	It can give deluding comes about when articles happen to be adjusted by possibility.
[3]		Euclidean Distance	98.46%	Euclidean distance is used to express the distance between any two points in any metric space. It is reportedly faster than most other means of determining correlation.	Where there is a high noise-to-signal ratio and negative spikes, any correlation is difficult to establish.
[6]		Canny	99%	Maximum edges are detected in this method. This method gives accurate result.	The result is binary. You sometimes need a measure of 'how much' the edge qualifies as an edge

VI. FUTURE WORK

We will implement this system in future. For better driver Assistant system we will combine Lane change detection and eye blink detection in one system. This system will work in both day and night situation. The accuracy rate is more than 95%.

VII. CONCLUSION

The following system could serve as a lifeline to automobile industry and government should take strict actions and make this certain basic requirements compulsory in automobile vehicles that will surely reduce the less of accidents and hence will aid to the national capital both financially and saving number of lives.

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