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Research Article

Bus Driver Distraction Detection using Machine learning

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Abstract

In this system, we proposed to condense the number of visual designs caused by driver's fatigue and thus progress road safety. This system focuses detection of driver's unconsciousness/inertness based on optical information and artificial intelligence. We locate, capture and analyze both, face and eyes of driver to measure PERCLOS (percentage of eye closure) with Softmax for neural transfer function. It will be also observe alcoholic symptoms & pulse throbbing to check out whether the individual is normal or abnormal. Driver's fatigue is one of the most important causes of traffic accidents, supreme for drivers of large vehicles (such as automobiles and heavy trucks) due to elongated driving periods and monotony in occupied situations.

Keywords: *Fatigue detection, Haar Cascade Algorithm, openCV, feature extraction, etc.*

Introduction

Sleeper User Fatigue is when a driver's capability to drive safely is compromised as a result of being actually or mentally tired otherwise sleepy. Driver's fatigue is a significant safety danger for the road transport
manufacturing.The main causes of 'drowsy d r i v i n g "are t o o l i t t l e sleep, driving next to times when you would generally be asleep and working or being awake for very long hours. EXHAUSTION, drowsiness and tiredness are often used similarly in drivinggovernment description. By Involving multiple human factors, it is multidimensional in nature that scientists have found difficulties to define over past decades. Despite the ambiguity neighboring fatigue, it is a critical factor for driving safety. Most Studies have shown that weakness is one of the leading contributing factors in traffic accidents worldwide. It will also keep check on use of alcohol & pulse detection to check out the person is normal or abnormal. It is overly critical for experienced drivers, such as drivers of buses and heavy trucks, due on the way to the fact that they may have to work over a prolonged duration of the light task, during the lawsuit lethargy periods.Driving involves the performance of set of actions along with situation awareness, as well as, Quick and accurate decision making.Situational awareness is critical in driving, as direct attention is required to process the perceived cues. Monitoring attention status is considered one of the most important parameter for safe driving.

Literature survey

Driver fatigue is one of the significant reason for road traffic and accident sparticularly for drivers of large vehicles (such as buses and heavy trucks) due to extensive driving periods and disgust in working conditions. In this paper, monitoring of fatigue detection system is depends upon the vision.which is simple for understand and flexible for deployment in buses. Systemconsists of modules which are head-shoulder detection, from the head-shoulder image face image of driver is detected, from that captured image particular eye image detection has done. after this process eye openness estimation process is followed which will be done by Euclidean distance formula then fusion which means combining both above processes results and putting output by using different algorithms,drowsiness measure percentage of eyelid closure (PERCLOS) estimation, and fatigue level classification is done[2]. The important inventive techniques are as follows: 1) depending upon eye openness based upon spectral regression is used 2) Algorithm used for fusion to estimate the eye state based on commutable integration on the multi modal detections of both eyes and their state. A strong measure of PERCLOS on the uninterrupted level of eye openness is defined, from this driver state is classified that driver is normal or abnormal.There are mainly having detection methods based upon vehicle, physiological behavior or machine vision. The trail and error results show the advantages of the system on accuracy and robustness for the challenging situations when a camera of an oblique viewing angle of driver's face is used for driving state monitoring.

In this study main purpose is to recognize link between the factors of fatigue (working schedule, working condition) and accidents of buses on the road.Fatigue slows down human response time which leaves the human unable to drive efficiently. Fatigue can be classified into active, passive and sleep. Active fatigue is mental exhaustion caused by active session in a task. Occupational risks natural in the work environment have become more important in the post- industrial societies.[3] These include a wide range of health problems ranging from asthma, heart attack, high blood pressure, stress and other psychological disorders, with many more to list. Occupational health is, an aspect seeking attention at the individual, group and community levels. The related study deals with ergonomics link between the worker and their working environment. Its impact on workers body would be discomfort, and it would cause many health problems. This present article is an attempt to explore the health risks among the bus drivers and conductors employed in State Road Transport Corporations [8]. The attempt is directed at investigating risk factors at micro- level in a community of drivers and conductors. It not only establishes the link between health and work environment but also facilitates in assessing the adverse effects that may be expected. The behavior of a driver is affects by many factors, which include the his personal activities, environmental conditions like rain, dust, mist and bus characteristics like tier puncture, break fail etc. Professional drivers, such as bus drivers, generally have higher levels of training and experience, and by virtue of their profession have attitudes, which are more likely to safe driving [5]. However, bus drivers experience the same environmental traffic condition as other drivers, as well as additional constraints imposed by the vehicle characteristics, concern for passengers comfort/safety and the need to adhere to timetables. This paper reviewed these factors from previous researches. Particular definition for fatigue is not conferred yet, but there is a relation between the fatigue, drowsiness and body temperature, electrical skin resistance, eye movement, respiratory rate, pulse rate and brain activity [3].In the field of fatigue detection, the current method is mainly based on (percentage of Eyelid Closure over the pupil over Time)only [1].However, the PERCLOS parameter can only reflect the total eye-closing time in a period of time, but this Parameter can not affect the time duration between the eye closure.

Proposed architecture

The proposed system described in the architecture contains main three modules. In this paper, represented a vision based system for bus driver fatigue detection. which is designed for simple and supple deployment on existing cameras in buses with no extra hardware cost required. In most existing buses, there are already many dome cameras installed for security purposes. One organized at the upper-right or upper-left position with respect to the driver to record the driver behavior on duty. The main cause of drowsy driving are too little sleep, driving at sleep when you would normally be asleep and working or being awake for very long years.Fatigue drowsiness sleepiness are often used synonymously in driving state description. Involving multiple human factors, it is multidimensional in nature that researchers have found difficult to define over past decades despite the ambiguity surrounding fatigue ,it is a critical factor for driving safety. count the eye blinking of bus driver fing the driver state drowsy or not.

1. Iris detection:

First is a driver face specialist carepre arrangement that can detect customer hypo vigilance (both weakness and distraction) by meeting out of eye and face sections as well as alcohol sensor detects the person is alcoholic or not. After image achievement, face uncovering is the first stage of handing out. Then, symptoms of hypo attentiveness are situated haul on sale from appearance image. Nonetheless, an explicit eye recognition step is not second hand to adjust the eye in the face, but then again very of essential indications related to appreciation region (top-half segment of the face) are extracted transfiguring the face detection process for all frames is computationally compound. Therefore, afterwards face uncovering in the first frame, Face Deer Stalking Algorithms to be situated/used on the way to track driver face popular the next frames without the face is missing. 2. Euclidean Distance Algorithm: Euclidean distance is mostly used for distance calculation,. This is what they are referring to Euclidean distance or simply 'distance'.It calculates the root of square differences between the coordinates of a pair of objects. Euclidean distance is generally known as Pythagorean theorem for testing (used as Euclidean distance classifier) for calculating the minimum distance between test.it recognize face and calculates image from training set of database for testing purpose, which easy and simple for understand

$$d_2(x,y) = \sqrt{\sum_{i=1}^{I} |X_i - Y_i|^2}$$

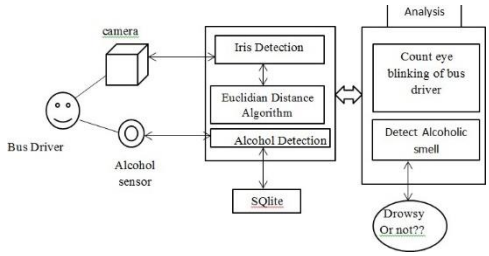

Fig. 1 Proposed DDoS Framework

3. Alcohol Sensor

Alcohol consumption impairs judgments of a person. A person loses the capacity to think properly when he

has consumed alcohol. The Alcohol Detection process depends upon simple functions that is if a driver has been drinking, when particular person breath near sensor that time sensor detects the level of alcohol and if it crosses a set threshold, then an alert will generate like message or buzzer then the bus engine will stop immediately. This system is designed for the safety of the people seating inside/outside the bus. This leads to several problems like

- Drinking and driving increases risk of accidents.
- Unintended harmful activities turning into violence. Selecting Haar Features:

MQ3 is a sensor which detects ethanol in the air highly and It is fighting fit acknowledged for animation able to perceive faces technically referred as Alcohol sensor. sensor has high sensitivity and body parts in an image, then can be trained in the direction of and good resistance to disturb gasoline, vapor and smoke for categorize almost any purpose. Let's take face detection as a case in detection of alcohol. The process of using MQ3 sensor is When a point. Initially, the algorithm needs a measurement of positive drunken person breathes near the alcohol sensor from his breath it images of appearances and negative images without faces to train the detects the ethanol which provides an output based on alcohol classifier. Then we need to extract features from it. First step is to concentration. Interfacing of MQ3 alcohol sensor module can be convey together the Haar Geographies. A Haar feature contemplates done easily With Microcontrollers, Arduino Boards, and next to rectangular regions at a Raspberry Pietc.

The Haar Cascade is trained by superimposing the positive image Creating Integral images: over a set of negative images.the training is generally done on server and on various stages.Better results are obtained by using Integral images are those images in which the pixel value at high quality images and increasing the amount of stages for any(x,y*)* location is the sum of the all pixels values present before which the classifier is trained.

Haar Cascade Algorithm

Haar cascade is machine leaning article, which is used for each stage present an ensemble of weak learners.where learners detection algorithm used on the way to recognize objects in an are also called as decisions stumps.its stages are trained by video or doppelganger based upon feature proposed by Paul adaptive boosting.boosting having the capacity to train highly best Viola and Michael Jones designer their paper "Speeedy object classifier by considering middle weight of decision gained by Detection using a Furthered Cascade of Unpretentious weak learners. mainly this test is done for checking the accuracy Features" in 2001. in face detection. Haar classifier object detection is used to detect It is a contraption learning based approach somewhere a face. By combining adaptive boosting with adaptive template cascade meaning is trained from a lot of positive and matching, face of driver is detected at the time of head rotation undesirable images. It is then used on the way to detect objects also. in other images.

The algorithm has four stages:

i. Selection of Haar Features
ii. Creating Integral Images
iii. Adaboost Training
iv. Cascading Classifiers

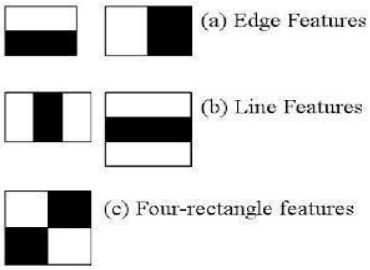

Fig.2 Feature Samples

Selecting Haar Features:

It is fighting fit acknowledged for animation able to perceive faces and body parts in an image, then can be trained in the direction of categorize almost any purpose. Let's take face detection as a case in point. Initially, the algorithm needs a measurement of positive images of appearances and negative images without faces to train the classifier. Then we need to extract features from it. First step is to convey together the Haar Geographies. A Haar feature contemplates next to rectangular regions at a Creating Integral images: Integral images are those images in which the pixel value at any(x,y*)* location is the sum of the all pixels values present before the current pixel
Adaboost Training

The cascade classifier consist of collection of various stages,whereeach stage present an ensemble of weak learners.where learners are also called as decisions stumps.its stages are trained by adaptive boosting.boosting having the capacity to train highly best classifier by considering middle weight of decision gained by weak learners. mainly this test is done for checking the accuracy in face detection. Haar classifier object detection is used to detectface. By combining adaptive boosting with adaptive template matching, face of driver is detected at the time of head rotation also.

Cascading Classifiers:

Positive resultshows that an object was found and negative indicates no objects were found. If the label is

not good or damagging, then the distribution of that region is complete, and detector moves to the next window and finds that locational processing id depends upon the label. If the label is positive, then classifier passes the regionto the next stage. After this processThe detector reports an object found at the current window location, it marks to the current location when the final stage classifies the region as positive.if label in negative then it detects that object is not found at the current location.

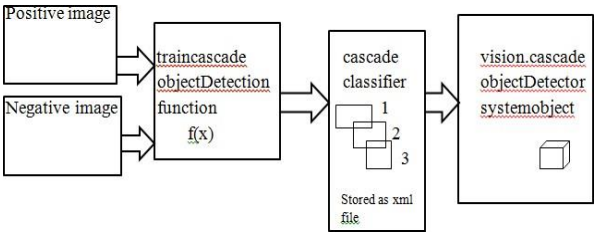

Fig. 3 sample classification

a) Scale Factor**:** at the time of scaling the value indicates how much size of image is bring down at each image scale. A minimum value uses a smaller step for downscaling .from this scaling This allows the algorithm to detect the face. It has a value of x, y where x and y are arbitrary values you canset.

b) MinNeighbors**:** minimum amount of neighbors point specified to the rectangle, required points are considered for scaling. the points having higher value it gives the less detection, and those points having min value gives the accurate result.But first case detects higher quality in an image. You can use a value of Xthat specifies a finite number.

c) MinSize: The word shows full meaning that object size is small. By default it is (30,30) If the face size in the is small then it will be easy to adjust minimum value as lower.
TrainingSteps to create a Haar-like Classifier:

Collection of Positive and negative training images Making positive images using objectmarker.exe or ImageClipper tools. Creating a.vec(vector) file based on positive marked images using createsamples.exe Training the classifier using Haartraining.exe Running the classifier using cvHaarDetectObject() Lets take face detection s an example. Intially, the algorithm needs a lot of positive images of faces and negative images without faces to train the classifier.then we need to extract features from it. First step is to collect the haar Feature. A Haar feature considers adjacent rectangular regions at a specific location in a detection window,sums up th pixel intensities in each region and calculates the differences between these sums.

A. Advantages of proposed system
- Defend the human.
- Little space canvassed invehicle.
- Easy to intensities in each region introduce.
- Here we get the correct level of liquor devoured by a man and its shows whether the individual is in intoxicated
- State or else ordinarystate.
- Drunk and driving and along these lines keepin gaway from mishaps.

Result and discussion

This system emphasizes on the detection of driver's inertness/unconsciousness based on visual information and artificial intelligence. We locate, capture and analyze both the driver face and eyes to measure PERCLOS (percentage of eye closure) with Softmax for neural transfer function. It will be also procedures alcohol & pulse uncovering to check out the individual is normal or abnorma

Conclusions

The bulge number of stream of traffic accidents due to a diminished awareness level of driver has developed a Serious problem for society. Statistics show that 20% of all the traffic accidents are due to car user with a moderated vigilance level. Furthermore, accidents related to chauffeur hypo-vigilance are more serious than supplementary types of accidents, since sleepy drivers often do not take correct action prior to a collision. For this reason, developing systems for specialist care Driver's level of attention and providing alert to driver, when he will be situate drowsy and not compensating adequate attention to the road, is essential to prevent accidents. It will also detect alcoholic symptoms& pulse recognition to check out the individual is normal or abnormal.

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