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Advance Driver Assistance System using Machine Learning Technique

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Abstract: Automated driving can make a big impact in society, creating new Feasibilities for mobility and reducing car accidents. Developments are made to provide driver assistance in the form of conditional and partial automation. The computer vision technology inside the vehicle increase the level of automation. However, a big challenge is embedding a vision-based driver assistance system with a special feature that helps to detect the pedestrians, Doziness, Face recognition, Traffic sign board detection by using machine learning. The system is very effective and reduces overall cost and development, by using camera with powerful computer vision and Machine Learning algorithm.

I. INTRODUCTION

The key system is to address whole deal and intérim targets and centers as a part of a protected vehicle (see ERSO[1] web message on street well being administration and vehicle security). Optional , more secure crash assurance innovations are being kept on passing on tremendous reserve funds; over the most récent couple of years, essential well being and crash shirking advancements have begun to add to set back decrease and hold vast future guarantee. Mean while, new-in-vehicle propels a work i advance can increase and more over decrease crash harm danger through showing new driver pre occupation and un planned behavioral change that may deal with one issue how ever make another. The security impacts of a portion of the advancements that are being advanced generally for the sake of well being presently can't seem to be illustrated. Additional promising security advances that address expansive street well being issues and where benefits have been exhibited are being advanced in just a couple of nations or are being taken up at lesser rate cross wise over at EU nations. The European Commission's autos 21 procedure (see cars21) conceives a car industry that is driving in innovation (clean, fuel-proficient, sheltered and associated) and where vehicle security can and ought to be additionally enhanced, for tenants and un protected street clients. The European Commission's automobiles 21 framework (Euro NCAP[2]) envisions an auto industry that is driving in advancement (clean, fuel-capable, protected and related) and where vehicle security can and should be also improved, for occupants and un protected road customers. With the fast improvement of new advancements on to the market, assessment of frame works alluding to the examination of definite middle of the road result information and also other important information is fundamental before wide-scale arrangement.

II. OBJECTIVE

The main objective of the project is to design an automated driver assistance system to avoid the traffic accidents and also reduces the cost of the device using computer vision techniques.

III. LITERATURE SURVEY

1) *Title:* Analysis of Driver's body activities for detection of Hypo vigilance due to non-driving emotional task .

a) *Description:* This paper explores how driver's body move may be affected by a non-driving and possibly distractive emotional task. We have collected data on body activities under several settings, such as cases in which emotional tasks are given alternately, or cases in which emotional tasks are given for a related long-time period. A diver adaptable method [3] is proposed to detect increase in tension via body activity. The method is examined with experimental data.

2) *Title:* Characteristics of driver fall asleep and crashes caused due to the attributes.

a) *Description:* It is known that sometimes the driver fell asleep during driving, the issue is because lack of knowledge on traffic safety programs that effects driving by having alcohol or over speed driving. The present examination is being done to research the attributes of the driver nodding off amid driving and how crashes caused. The study uses the database at the Highway Safety Research Center at the University of North Carolina that is based on the uniform crash reporting system[4] in that state. Throughout the years 1990-1992 there were 4333 crashes in which the driver was judged to be snoozing however not be

inebriated. The accidents were essentially of the drive of the street compose(78% of the total) and took place at higher speeds (62% excess of 50mph). The casualty rate was of comparable size to that in liquor related crashes with fatalities in 1.4% of such crashes (alcohol crashes had fatalities with 2.1%). The accidents happened fundamentally at two times of day- during nighttime period of increased sleepiness (midnight to 7a.m.) and during the midafternoon 'siesta' time of increased sleepiness (at 3p.m.). These accidents happened predominately in youngsters. Fifty five percent of these were in people 25 years old or more youthful, with a pinnacle period of event at 20 years. Sleepiness may play a role in crashes other than those attributed by the police to the driver being asleep. Determining the magnitude of this role is a challenge to the traffic safety community.

3) *Title:* Performance comparison of some face recognition algorithms on multi-covariate facial databases

a) *Description:* Facial acknowledgement-based is universal. From domestic to industrial usage, these automated methods have become an essential part of this digital world. The problem of face verification has been exhaustively researched, thereby producing some robust and accurate face recognition algorithms. Our present work investigates and relatively analyzes the effectiveness of eight such algorithms which have been widely studied and implemented in the research community. The performances of these techniques have been evaluated on six real-life facial databases, thereby providing baseline results for each one. Thus, our comparative study not only analyzes the usefulness of each method but also would (hopefully) provide guidelines in designing application specific facial recognition techniques in the near future.

4) *Title:* A smart driver alert system for vehicle using image detection and recognition technique.

a) *Description:* Road signs are important to ensure smooth traffic flow without bottle necks or mishaps. Road symbols are the pictorial representations having different necessary information required to be understood by the driver. Road signs in front of the vehicle are ignored by the drivers and this can lead to catastrophic accidents. This paper presents an overview of the traffic sign board detection and recognition and implements a procedure to extract the road sign from a natural complex image, processes it and alerts the driver using voice command It is implemented in such a way that it acts as a boon to drivers to make easy decisions.

5) *Title:* Further Implementations and Evaluation of a cooperative vehicle-to-pedestrian safety application.

a) *Description:* While the improvement of Vehicle-to-Vehicle (V2V) security applications in view of Dedicated Short-Range Communications (DSRC[5]) has been widely experiencing institutionalization for over 10 years, such applications are amazingly absent for Vulnerable Road Users (VRUs). Nonexistence of synergistic frameworks amongst VRUs and vehicles was the primary purpose behind this absence of consideration. Late advancements in Wi-Fi Direct and DSRC-empowered cell phones are changing this point of view. Utilizing the current V2V stages, we propose another structure utilizing a DSRC-empowered cell phone to stretch out wellbeing advantages to VRUs. The interoperability of uses amongst vehicles and compact DSRC empowered gadgets is accomplished through the SAE J2735 Personal Safety Message (PSM). In any case, considering the way that VRU[6] development elements, reaction times, and crash situations are on a very basic level not quite the same as vehicles, a particular structure ought to be intended for VRU wellbeing applications to ponder their execution. In this article, we proposed a conclusion to-end Vehicle-to-Pedestrian (V2P) system to give mindfulness and danger identification in light of the most well-known and damage inclined crash situations. The points of interest of our VRU security module, including target arrangement and impact location calculations, are clarified straightaway. Besides, we propose and assess a relieving answer for blockage and power utilization issues in such frameworks. At last, framework is executed and investigated for practical crash situations.

A. Existing System

The existing system uses a dual control scheme which identifies the driver’s drowsiness and prevent the lane departure accidents. These dual schemes are classified into two types Direct driver related and In-direct driver related measurements.

The existing system results demonstrate that it can contribute to identify driver's drowsiness and preventing lane departure accidents. But it cannot assure accurate prevention of accidents as it is takes much time to come back to center of the lane.

The existing system uses the dual control schemes. In this system the controlled objects vehicle and the object to be estimated through the control signal is driver's state.

B. Disadvantages

1) Depends on non-smart sensor data, which might fail to produce better results.
2) It takes much time to respond.
3) Materials cost is high.

V. PROPOSED SYSTEM

In this paper, we proposed a new and combined module for advance driver assistance system for avoiding traffic accidents. To implement the Facial Recognition, Drowsiness, Traffic Sign Board Detection, Pedestrian Detection as group using machine learning techniques for better performance.

Modules

A. Facial Recognition

In this module the facial images will be extracted, cropped and resized and usually converted to grayscale, the facial recognition algorithm is responsible for finding characteristics which best describes the image. Here we are using Local Binary Pattern(LBP[7]) and Support Vector Machine (SVM[8]) for identifying the face in an effective way.

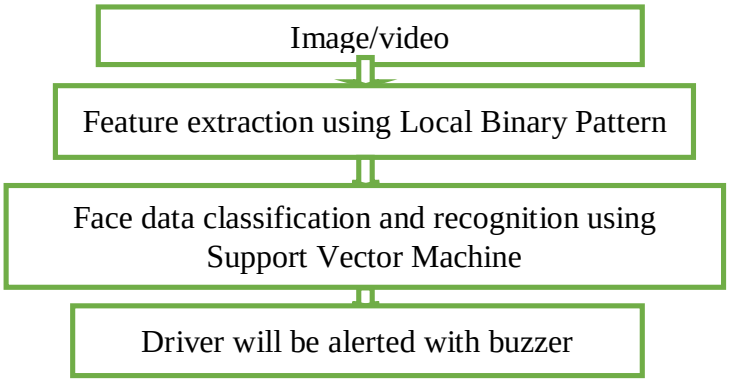

Fig.1.Block diagram of Face Recognition

B. Drowsiness Detection System

In this module by using Key Point Detectsors[9], facial landmarks are identified, using the particular landmark i.e. each eye have 6 land marks. Using the 6 point an ellipse can be drawn, and thus by using the short width of the ellipse the eye whether closed or not can be identify.

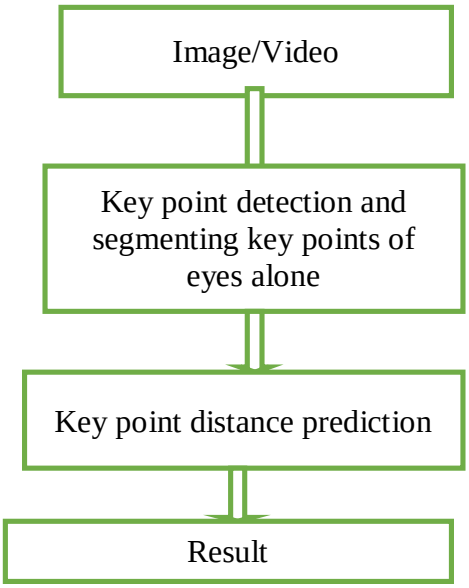

Fig.2. Block diagram of Drowsiness Detection

C. Pedestrian Detection

In this module we use pre trained data sets of human which are used and featured these are extracted using Histogram of Oriented Gradients (HOG[10]) , and are further classified as human and non-human using the SVM classifier. If the pedestrian is detected in this classifier it will intimate to the driver.

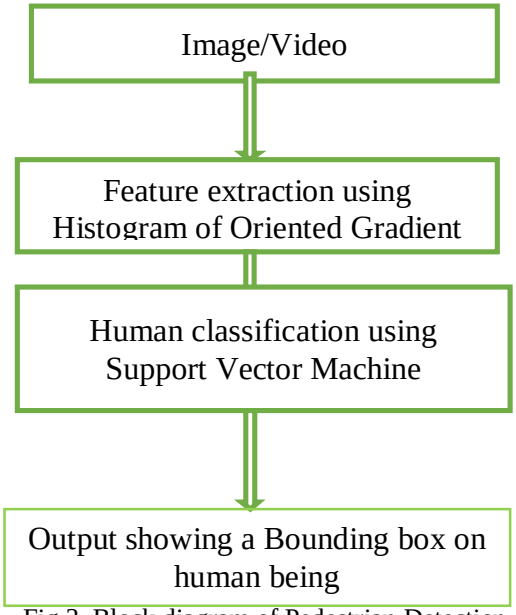

Fig.3. Block diagram of Pedestrian Detection

D. Traffic Sign Board Detection

In this module the images at different views of the sign board are taken and stored each category. The algorithms used in this are Histogram of Oriented Gradients **(**HOG) and Support Vector Machine(SVM).

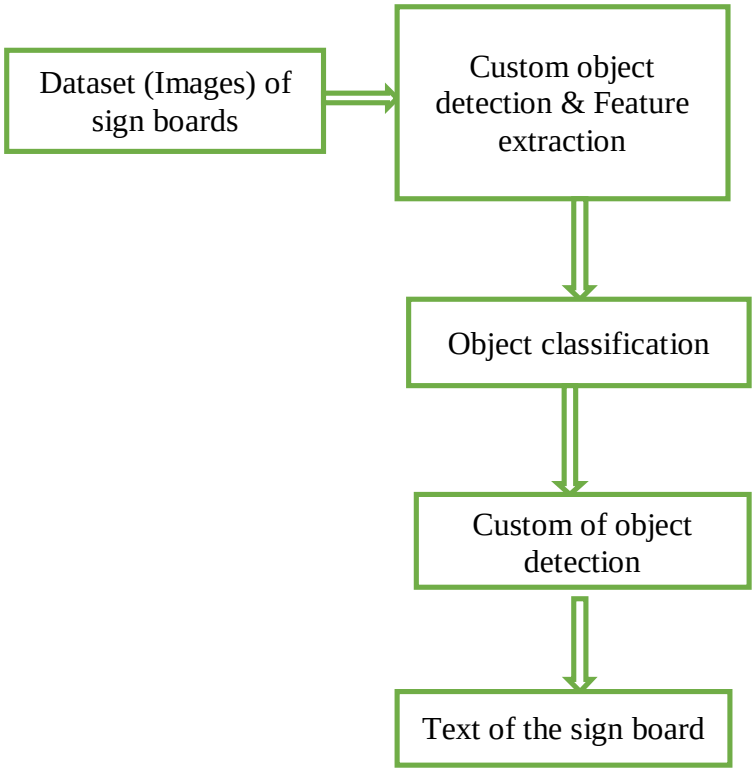

Fig.4. Block diagram of Traffic Sign Board

E. Advantages

1) In proposed system the involvement of artificial intelligence, will fetch robust yet best results.
2) The data helps in predicting at a higher accuracy of 90% with less slip through rate less than 10%.
3) In this method usage of single camera yields all the functionalities of modules.
4) The proposed system uses open source technologies as the cost decreases as no buying of software is involved.
5) The overall accuracy of system is higher than 90% for all the modules.

F. Algorithm Description

1) Support Vector Machine (Svm)

SVM classifier is dealt with as one of the predominant characterization calculations. When we have a dataset with highlights and class names both then we can utilize Support Vector Machine. Be that as it may, if in our dataset don't have class names or yields of our list of capabilities then it is considered as an unsupervised learning calculation. All things considered, we can utilize Support Vector Clustering.

There are 2 sorts of SVM classifiers:

a) *SVM Linear Classifier:* In the direct classifier demonstrate, we accepted that preparation illustrations plotted in space. These information indicates are normal be isolated by a clear hole. It predicts a straight hyperplane partitioning 2 classes. The essential concentration while drawing the hyperplane is on expanding the separation from hyperplane to the closest information purpose of either class. The drawn hyperplane called as a most extreme edge hyperplane.
b) *SVM Non-Linear Classifier:* In reality, our dataset is for the most part scattered up to some degree. To take care of this issue division of information into various classes based on a straight direct hyperplane can't be viewed as a decent decision. For this Vapnik proposed making Non-Linear Classifiers by applying the bit trap to most extreme edge hyperplanes. In Non-Linear SVM Classification, information focuses plotted in a higher dimensional space.

G. Histogram of Oriented Gradients (HOG)

To compute Histogram of Oriented Gradients by five stages

1) Histogram of oriented gradients is used in computer vision and object detection. This is used for counting the localized portions of an image.
2) HOG descriptor may be used for object recognition by using machine learning algorithms, but these are not tied to a specific machine learning algorithms.
3) Gradient computation: The first step is to ensure color and gamma values. The common method is to apply derivative mask in one or both of the horizontal and vertical directions. Specifically this method requires filtering the color.
4) The second step is to create the cell histograms. The cells can be in the shape of rectangular or radial in shape. Histogram channels are spread to 0 to 180 degrees or 0to 360 degrees depending on signed or unsigned gradients.
5) Computation of HOG descriptor require:
a) Masks to compute derivatives and gradients
b) Splitting an image into cells and grouping cells in to a block
c) Block overlapping.
d) Normalization parameters

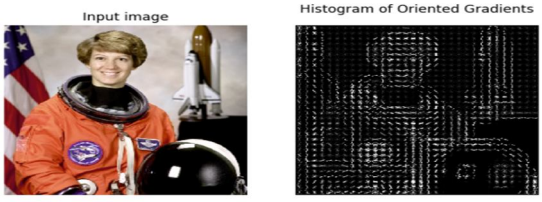

Fig.5.Histogram of Oriented Gradients

H. Local Binary Pattern

The substance of an individual passes on a great deal of data about character and enthusiastic condition of the individual. Face acknowledgment is an intriguing and testing issue, and effects vital applications in numerous regions, for example, recognizable proof for law implementation, validation for keeping money and security framework access, and individual ID among others,

fundamentally comprises of three sections, in particular face portrayal, highlight extraction and grouping. Face portrayal speaks to how to show a face and decides the progressive calculations of discovery and acknowledgment. The most valuable and one of a kind highlights of the face picture are separated in the element extraction stage. In the characterization the face picture is contrasted and the pictures from the database. In our examination work, we exactly assess confront acknowledgment which considers both shape and surface data to speak to confront pictures in light of Local Binary Patterns for individual free face acknowledgment. The face zone is first partitioned into little districts from which Local Binary Patterns (LBP), histograms are separated and connected into a solitary element vector. This component vector shapes an effective portrayal of the face and is utilized to quantify similitudes between pictures.

VI. CONCLUSION

This paper has discussed an advanced driver assistance system in an effective manner to prevent vehicle accidents. In this paper we used advance machine learning algorithm techniques based on the communication between the system and the driver. Using the high-end machine learning techniques helps the system to give the accurate outputs.

We made the hypothesis in such a way that the driver cannot take the action if he or she falls asleep. In such an event the control system takes the action to assist the driver. Based on the stored image the system will recognize the face and compares the input image to the stored image and gives the accurate output. In pedestrian detection will extract the image using Histogram of Oriented Gradients (HOG) and classify the human using Support Vector Machine (SVM) and gives the output showing bounding box on human being. We will collect data sets of sign board then we will extract the features and classify the object and do the custom object detection to fetch the robust at best results.

VII. FUTURE WORK

It is necessary to improve the identification algorithm for the early detection of driver condition. The accuracy may fall down if the camera cannot detect face properly, we can overcome it by using high end cameras. In sign board detection we can improve the efficiency if the driver able to know the time earlier before the release of traffic. In pedestrian detection we have to collect different types of images and shapes of human beings for the accurate detection of human beings, to assist the system.

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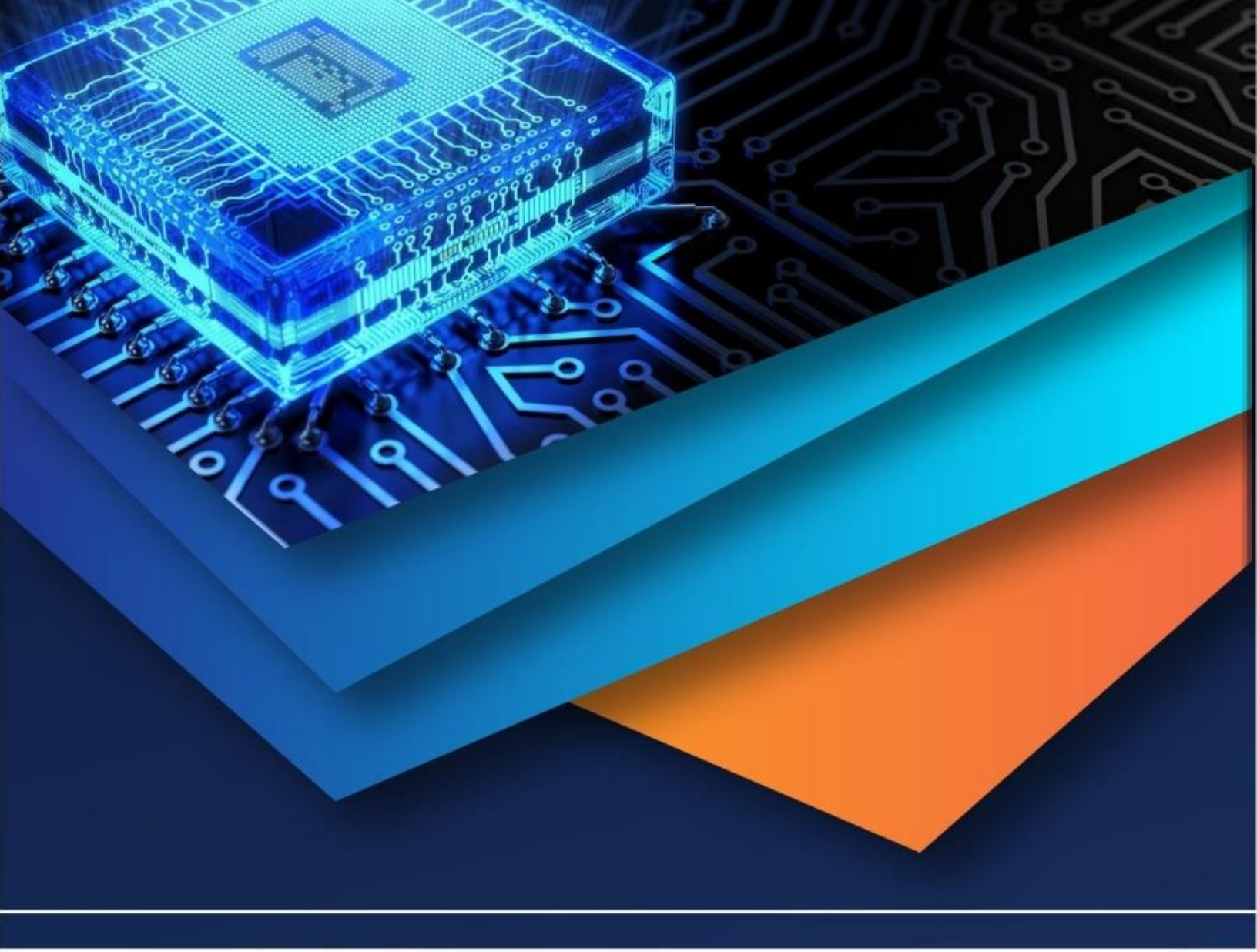

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