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Lassitude Detection Based on A Chromatic Features of The Driver

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ABSTRACT: Driver exhaustion detection is to alert the driver based on their visual characteristics. It detects the driver's face through the camera and checks for fatigue level. This project is developed with the help of Python, Machine Learning, and Image processing. And to achieve a face detection cascade algorithm is required. Driver exhaustion is one of the major causes of road accidents Nowadays there is a lot of awareness is going on for every particular problem, but most of them are not taking it as seriously, just they will listen and still they do the same mistake again and again which is why most of them are facing the same problem even though after spreading the awareness .so, the same problem is repeated when it comes to the road safety, vehicle safety, and driver safety, only awareness is not going to bring any changes in the society, just to keep them alert on every movement then that can be achieved with the help of technology.

KEYWORDS: Machine Learning, Image Processing, and cascade.

I. INTRODUCTION

Driver drowsiness detection system is nothing but detection of driver's exhaustion to prevent the road accidents which may occur due to sleepiness of the driver. According to the survey twenty percent of road accidents are fatigue-related and up to fifty percent are on certain roads. Driver exhaustion is the main reason for a greater number of car accidents. Developing this kind of technology to avoid or prevent drowsiness is very difficult and it is important in the preventing accident system area. Because exhaustion happens while driving, for that purpose so many methods needs be developed to overcome this problem. Driver's lack of attention due to drowsiness may distract the driving alertness. Same way driver drowsiness is the same as driver's distraction, so just to make the driver alert at every situation technology is required to make them attentive. Haar cascade algorithm is used to detect the object to identify faces in image. Here we are going to focus on face detection, so to achieve this we require positive images like face and negative images is like without having face in the image to train the classifier, and then features from the images need to be extracted. Haar is to calculate each feature of the value by pixel to pixel through the below-mentioned figure, then it is going to highlight as a black portion where its needs to understand that it is performing the operation. The shape predictor used to predict the structure of the object to convert into coordinates (x,y), and then extracts the required object as per the inputs. The system is going to convert the actual image into facial landmarks if the required object is present in that image, then facial landmarks is converted into coordinates and then it will locate eye and mouth and only those coordinates will be considered and calculates the eye and mouth aspect ratio. This predictor ignores all other objects present in the image; it is going to search for face and then starts the performing operations on processing. Image processing is way to perform some image operations in order to extract few important information about it. It's like a signal processing input and output both the features are connected with image. It avoids the noise and distortion in the digital image while using wide range of algorithm.

II. RELATED WORK

In thispaper, the exhaustion detection system has been implemented group of electroencephalograms (EEG) and eye condition to get a correctness status of an alarm. It is IOT based project with the help of NeuroskyMindflex headset which is used to study the brain wave data and detect the driver's exhaustion. For this we need to wear this device on our forehead and there is some wires are used to connect the device[1].In [2] Paper. It is not going to detect the drowsiness but also predicts the driver's impairment of challenge. The goal of this project is to find drowsiness detection information is sufficient to access and predict the future level will be reached. It has also explored having a

data of driving moment and driver data grows the exactness in detecting and analysing of the driver's exhaustion. The Study of this paper has been investigated the feasibility of classification of driver alertness. To build this project a random forest algorithm is used to achieve 78.7% of accuracy for alerting the drowsy detected system. And even ensemble algorithm is used for hybrid sensing and 82.4% of accuracy is achieved to find the alert and drowsy alert state. And 95.4% of accuracy has already classified in the moderately driver exhaustion state[3]. With the help of machine learning the project is developed based on data mine on real human behaviour during drowsy detection. It has classified 30 actual facial to does the facial action coding system is developed with the help of machine learning on a different database. This action has motion like blinking and yawning, even other facial movements. Head movement is also collected, but it is through automatic with the help of eye tracking motion which is automatic process[4]. In [5] paper the authors implemented with a smaller number of tools to build the project. So, it's a simple and straight forward system, just for detecting the sleepiness of the driver using latest technology are used with minimum requirements. They have just implemented for eyes to detect the number of its blinks and based on that data it alerts the user. The methodology of this project is to help users with fatigue related issues[6]. Machine learning techniques is implemented to expect the current situation and feeling of driver to get the data to provide protection on the road. And Even Artificial intelligence methods has been implemented for automatically learning purpose, it helps to improve the system automatically without programming, but unfortunately, they could not do it with 100% efficiency. But this paper is later converted into research to develop with better solution. This Research provides comparative study to identify the challenges faced by present situation and current corresponding research opportunities.[7]

III. METHODOLOGY

The intended system provides the driver safety such as drowsiness detection, tracks driver's concentration, monitors driver's behavior continuously, locates eye and mouth from face image for drowsy detection and also estimates head movement detection. So, to develop this system python, machine learning and image processing is used to accomplish this project. This project is going to capture the images of drivers, then those images will be converted into graycolored with the help of image processing technology and it will extract the required features from the face and then starts processing those images whether there are required objects are available into the frames. And if this condition satisfies then it proceeds with calculation that is Euclidean Distance to calculate the left and right eye distance and also it calculates the whether the eye is open or close. By using python array concepts, the extraction of eye and mouth coordinates from facial structure is possible can be done. And the head movement feature is also added to detect the exhaustion of driver, like if the driver head is not in proper posture and it is tilted here and there then it is going warn the driver with alarm.

[1] Driver Exhaustion Detection Architecture

The figure.1 describes the architecture of the exhaustion detection system, there are 3 features are present in architecture diagram and they are Eye, Mouth and head movement as soon as these three features detects the drowsy then it will display the message or either gives an alarm. firstly, it is going to capture the images of driver then it goes into face detection after that it extracts the facial features like Eye and Mouth if that condition satisfies it considers as exhaustion detected. And simultaneously it also detects the head movement detection if the drivers tilt their head while driver then detects the drowsiness and gives the alarm.

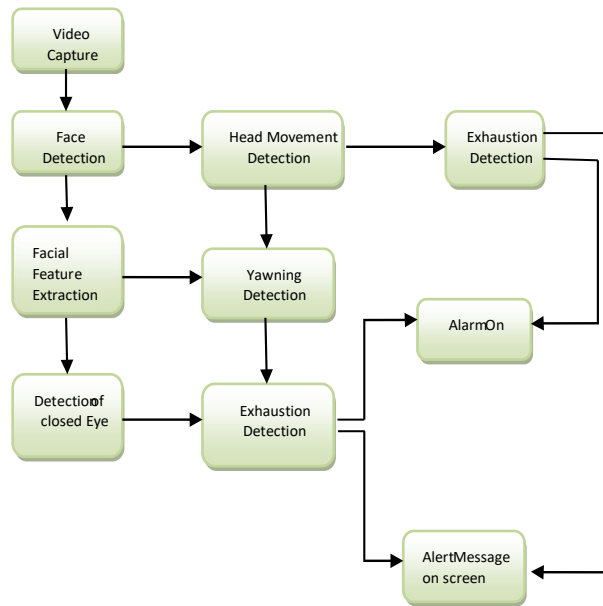


Fig 1. Driver Exhaustion Detection Architecture

[2] “HAARCASCADE” ALGORITHM

This algorithm is used to detect the object to identify faces in image. Here we are going to focus on face detection, so to achieve this we require positive images like face and negative images is like without having face in image to train classifier, and then features from the images need to be extracted. Haar is to calculate each feature of the value by pixel to pixel through below mentioned figure, then it is going to highlighted as a black portion where its needs to understand that it is perform the operation. After that every possible size can be able to calculate because there is lot of features is present to calculate for each individual like there is 160000 features are available for 24x24 windows.

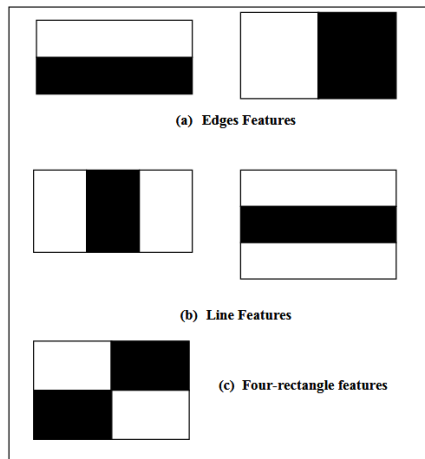


Fig 2. Facial Feature Extraction

[4] Image Processing

Image processing is way to perform some image operations in order to extract few important information about it. It’s like a signal processing input and output both the features are connected with image. Through the algorithm the digital images will be processed. It avoids the noise and distortion in the digital image while using wide range of algorithm. There are a greater number of techniques for digital image processing to transform the image and make use of it in different ways. There is an equal enhancement in exhaustion monitoring technology in past few years, these advancement in technology have guaranteed safety and advantage to the drivers .so with the help of image processing eye and mouth behaviour detection can be determined through the digital image after avoiding the negative

disturbances in the image. Generally, image processing includes three steps; with the help of image tool the images can imported, processing and converting the image, after processing the is changed to show the result. The method of image processing can be done on photographs and digital images by using computers. The way of analysing and processing the image can be manipulated through the image processing method to enhance and display what information is acquired from the image. When it comes to detection image resize is necessary to increase or decrease the pixels, whereas it occurs image interpolation when it is corrected according to frame required to capture.

[5] Shape Predictor

The Figure 3 exhibits the coordinates of the face so each corner in the face is converted into coordinate points to divide the features and calculate the drossiness level then based on exhaustion level can be able to predict. This coordinate has 68 out of which the eye is having 6 coordinates and 8 for mouth, so it is going to extract only this feature for detection of drowsiness. This can be possible with the help of image processing OpenCV library. And there is x and y axis of the coordinates to extract the feature. So, to extract these exact coordinates from the facial landmarks then, with the help of python technology it is easy to fetch those landmarks.

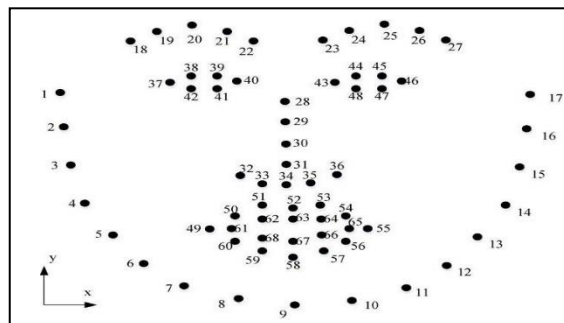


Fig 3. Facial Landmarks

[5] Formulas to Calculate Eye and Mouth Aspect Ratio

The Figure 4 are the coordinates of eye aspect ratio and above-mentioned formula is to calculate the aspect ratio of Eye to identify whether the eye is closed or opened. So based on this result it will detect the exhaustion level. It has 6 (x, y) coordinates. The numerator is to calculate distance of vertical eye and denominator calculates the horizontal eye. There are one set of straight and two set of straight up coordinates.

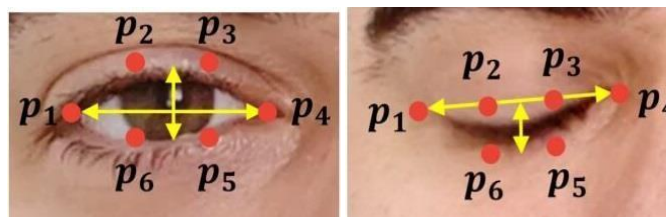


FIG 4. EAR ASPECT RATIO (EAR)

$$EAR = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

[6] MOUTH ASPECT RATIO (MAR)

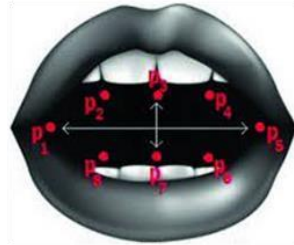


FIG 5. MAR (ASPECT RATIO OF MOUTH)

$$MAR = \frac{||P3 - P7||}{||P1 - P5||}$$

Figure 5 is a coordinates of Mouth aspect ratio and it is to check the whether the user is yawning or not to check the drowsy status of driver. It has the 8 (x, y) coordinates to calculate the mouth region. So, it is the vice-versa of Eye and Mouth aspect ratio. Using Haar cascade algorithm it can able to extract the mouth region.

[7] Video Capture

Through the web camera or car dashboard camera the images will be captured into the specified frames. This face is going to be processed to check whether object is available in the image are not. This video is model to have some frequency and those frames will be used for face detection. These images will differentiate between Negative and Positive. It is nothing but whether the frame has captured the expected object, then it is considered as positive image. If the frame doesn't contain any expected object, then it nothing but negative.

[8] Face Detection and required features extraction unit

Face detection happens when images is processed through the video capture unit. The images will be in RGB coloured images to capture a brighter image even though the images captured in dark night. Because the algorithm will make sure that the images processing should execute in low light for enhancement of image and to eliminate the unnecessary disturbance in the frames. With the help of enhancement of image contrast, the image is going to removes the noise from the frames which is exceptionally captured and then it is amplified.

[9] Fatigue Detection

After this face detection, next the system is going to detect the drowsiness within the extracted features from the image that is Eye and Mouth of the driver. With the help of this dataset, we can analyze exhaustion through these different facial features. The facial features are nothing but eye or mouth. With this we get an exhaustion report based on the facial features if it is available in the images. So, its extracts the pixel by pixel for face detection which contains lot of features. The size of vector is 4000 if it behaves as per the pervious facial extraction unit. At the end the classifier is going to return 1 as the driver is detected as fatigue or else returns -1 to give the alert alarm to driver.

[10] Alert Alarm

The depiction of alert alarm is in the form of (r, t), {r>=0, t>=0}, where r is an output and time t need to be calculated and processed in a given time. It completely depends on the result of exhaustion detection. The difference of the output is classified by either a+1 or -1. Particularly, the output of the classification is processing through the input that sums the sequential output number which is a smaller number of values up to zero. So, to give an alarm we need to set the threshold value in two levels; first is to detect the fatigue level yes or no. And the next is to check the variation between low or high exhaustion level by giving the threshold value. Each time if the threshold reaches more than the specified value of threshold, then it understands that alert status will get active and does the detection as the exhaustion level.

IV. RESULTS

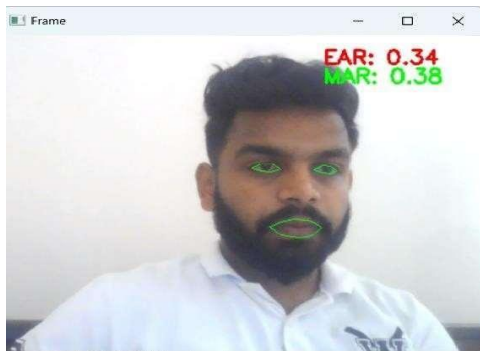


Fig. a. Face Detection

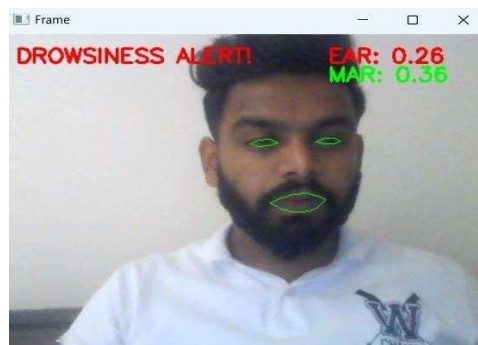


Fig. b. Closed eye detection



Fig.c. Yawning Detection



Fig. d. Head Movement Detection

V. CONCLUSION AND FUTURE WORK

Driver drowsiness detection is to protect the drivers from road accident by identifying their exhaustion level with the help of camera. The intension to develop this project is to make this kind of technology available in every vehicle like Car and Truck to prevent the accident. So that we can reduced the accidents. By the Machine Learning and image processing, was able to develop this system. So, the proposed framework can be a highly productive framework to screen exhaustion of driver and can rule over impediments from recently created techniques by utilizing both eye and mouth highlight set and furthermore with an immense pool of information. So, this framework needs just a camera to screen the driver face, hence diminishing its equipment cost.

REFERENCES

1. Kondapaneni, Akhil & Hemanth, C. & Sangeetha, R.G. & Priyanka, R. & Saradhi, M. "A Smart Drowsiness Detection System for Accident Prevention", 2020 National Academy Science Letters, Vol. 44, doi: 10.1007/s40009-020-01000-3.
2. Charlotte Jacobé de Naurois, Christophe Bourdin, Anca Stratulat, Emmanuelle Diaz, Jean-Louis Vercher, "Detection and prediction of driver drowsiness using artificial neural network models, Accident Analysis & Prevention", 2019, 10th International Conference on Managing Fatigue: Managing Fatigue to Improve Safety, Wellness, and Effectiveness, pp.95-104, ISSN 0001-4575, doi: 10.1016/j.aap.2017.11.038.
3. Gwak J, Hirao A, Shino M. "An Investigation of Early Detection of Driver Drowsiness Using Ensemble Machine Learning Based on Hybrid Sensing". Applied Sciences, 2020, Vol 10(8):2890. doi: 10.3390/app10082890.
4. Jang, Seok-Woo and Ahn, Byeongtae "Implementation of Detection System for Drowsy Driving Prevention using Image Recognition and IoT", Sustainability 2020, pp.7 (Volume 12), doi: 10.3390/su12073037.

5. Vural, Esra& Cetin, Mujdat&Ercil, Aytul&Littlewort, Gwen &Movellan, Javier. "Machine Learning Systems for Detecting Driver Drowsiness",2007 doi: 10.1007/978-0-387-79582-9_8.
6. Tayyaba Azim, M. Arfan Jaffar, M. Ramzan and Anwar M. Mirza "Automatic Fatigue Detection of Drivers through Yawning Analysis
7. V B Navya Kiran, Raksha R, Anisoor Rahman, Varsha K N, Dr. Nagamani N P, 2020, "Driver Drowsiness Detection", International Journal of Engineering Research & Technology (IJERT) NCAIT – 2020 (Volume 8 – Issue 15), ISSN: 22780181.
8. Gupta, Rajat & Aman, Kanishk& Shiva, Nalin & Singh, Yadvendra.."An Improved Fatigue Detection System Based on Behavioral Characteristics of Driver, 2017.
9. Azim, Tayyaba & Jaffar, Arfan& Ramzan, M. & Mirza, Anwar."Automatic Fatigue Detection of Drivers through Yawning Analysis", Communications in Computer and Information Science 2010,pp. 125-132 (Volume 61) doi: 10.1007/978-3-64210546-3_16.
10. A. Mary Sefia, J. Anitha Gnana Selvi " Driver State Analysis And Drowsiness Detection Using Image Processing", (2016) International Journal of Scientific Engineering and Applied Science (IJSEAS) pp. 252-256, ISSN: 2395-3470.
11. B. Reddy, Y. Kim, S. Yun, C. Seo and J. Jang,"Real-Time Driver Drowsiness Detection for Embedded System Using Model Compression of Deep Neural Networks," in 2017 IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW), Honolulu, HI, USA, 2017 pp. 438-445, doi: 10.1109/CVPRW.2017.59.
12. G. Zhenhai, L. DinhDat, H. Hongyu, Y. Ziwen and W. Xinyu, "Driver Drowsiness Detection Based on Time Series Analysis of Steering Wheel Angular Velocity," in 2017 9th International Conference on Measuring Technology and Mechatronics Automation (ICMTMA), Changsha, Hunan, China, 2017 pp. 99-101.doi: 10.1109/ICMTMA.2017.0031.



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