International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 7 July 2023, pp: 806-815 www.ijaem.net ISSN: 2395-5252

Drowsiness Detection Using Opencv and Machine Learning

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Date of Submission: 20-07-2023 Date of Acceptance: 31-07-2023

ABSTRACT

More and more jobs today require long-term focus. Drivers must keep an eye on the road so that they can react quickly to sudden situations. Driver fatigue isusually a direct cause of many traffic accidents. So, the idea is to create a system that recognizes and informs drivers of terrible psychophysical conditions. Fatigue-related car accidents can be significantly reduced. However, the development to these devices presents many challenges associated with quickly and accurately determining signs of driver fatigue. One of the special consequences of running a frame to detect driver fatigue is the use of a vision-based approach. Here, the driver's fatigue is judged based on visibility.

Keywords: Supervised Learning (SL) ,Unsupervised Learning(UL)

I. INTRODUCTION

Driver tiredness discovery may be a car security innovation which avoids mishaps when the driver is getting lazy. Different considers have proposed that around 20% of all street mishaps are fatigue-related, up to 50% on certain streets. Driver weakness could be a critical calculate in an expansivenumber of vehicle mischances. Later measurements assess that yearly 1,200 passing and 76,000 wounds can be credited to weariness related crashes. The improvement of technologies for recognizing or avoiding laziness at the wheel could be a major challenge within the field of accident evasion frameworks. Since of there is that laziness presents on the street, strategies got to be created for neutralizing its influences. Driver carelessness may be the result of a need ofsharpness when driving due to driver tiredness and diversion. Driver diversion happens when aprotest or occasion draws a person's consideration absent from the driving errand. Not at all likedriver diversion, driver laziness includes no activating occasion but, instep, is characterized by adynamic withdrawal of consideration from the street and activity requests. Both driver tiredness and diversion, in any case, might have the same impacts,i.e., diminished driving execution, longer response time, and an expanded hazard of crash inclusion. appears the piece chart of in general framework. Based on Procurement of video from the camera that's before driver perform real-time preparing of an approaching video stream in arrange to gather the driver's level of weariness onthe off chance that the laziness is Estimated at that point it'll deliver the caution by detecting the eyes.the lives and the values. A considerable amount of literature shows that theleading cause of accidents is drowsiness and fatigue. Various studies were conducted to identify issues with several areas, including IoT, Machine learning, and Mobile application. to avoid accidents effectively. Machine learning has numerous applications in the. However, the accuracy and the efficiency used in the above researches are not significantly finding the target.To overcome the said problem, this study focuses on a hybrid approach to detect drowsiness and fatigues using deep learning; and IoT is used internet of things (IoT). One of these technological trends is E-care, which brings us information inreal-time andcontinuous patient monitoring with predictive decision making.

II. LITERACTURE REVIEW

More and more professions now days require concentration over the long term. Drivers must keep a near eye on the street, so they can respond to sudden occasions quickly. Driver fatigue typically becomes an instantaneous reason behind several traffic accidents. In this manner, there's a ought to create the frameworks that will distinguish and inform a driver of her/his terrible

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psycho physical condition, which may essentially diminish the number of fatigue-related car mishaps. Developingthese devices, though, experiences several difficulties linked to swift and proper identification ofthe exhaustion signs of a rideerr. One of the specialized conceivable outcomes to execute drivertiredness discovery frameworks is to utilize the vision-based approach. Here we are identifying the driver drowsiness by evaluating vision framework of him.

Index Terms - Drowsiness Detection, Image Processing, OpenCV. I. Driver tiredness discoverymay be a car security innovation which avoids mishaps when the driver is getting lazy. Different considers have proposed that around 20% of all street mishaps are fatigue-related, up to 50% on certain streets. Driver weakness could be a critical calculate in an expansive number of vehicles. mischances. Later measurements assess that yearly 1,200 passing's and 76,000 wounds can be credited to weariness related crashes.The improvement of technologies for recognizing or avoiding laziness at the wheel could be a major challenge within the field of accident evasionframeworks. Since of the risk that laziness presents on the street, strategies got to be created forneutralizing its Driver carelessness may be the result of a need of sharpness when driving due todriver tiredness and diversion. Driver diversion happens when an protest or occasion draws aperson's consideration absent from the driving errand. Not at all like driver diversion, driverlaziness includes no activating occasion but, instep, is characterized by a dynamic withdrawal of consideration from the street and activity requests. Both driver tiredness and diversion, in any case, might have the same impacts, i.e., diminished driving execution, longer response time, and anexpanded hazard of crash inclusion. appears the piece chart of in general framework. Based on Procurement of video from the camera that's before driver perform real-time preparing of an approaching video stream in arrange together the driver's level of weariness on the off chance that the laziness is Estimated at that point it'll deliver the caution by detecting the eyes.In this paper,we have built a drowsy driver caution framework merely can execute in various ways.We used OpenCV to identify faces and eyes employing a hear cascade classifier and after that we utilized a CNN show to fore see the status. This system will be expanded more and include plentiful safety highlights, for example, only a certain amount of people will come to or operate the car. Should an effort to steal the car would arise, the engine of the vehicle will not function, or a warning tone can be detected. For a nalleged robbery, an image of the burglar is sent to the vehicle's owner that will file a lawsuit against the vehicle's robber.

BLOCK DIAGRAM

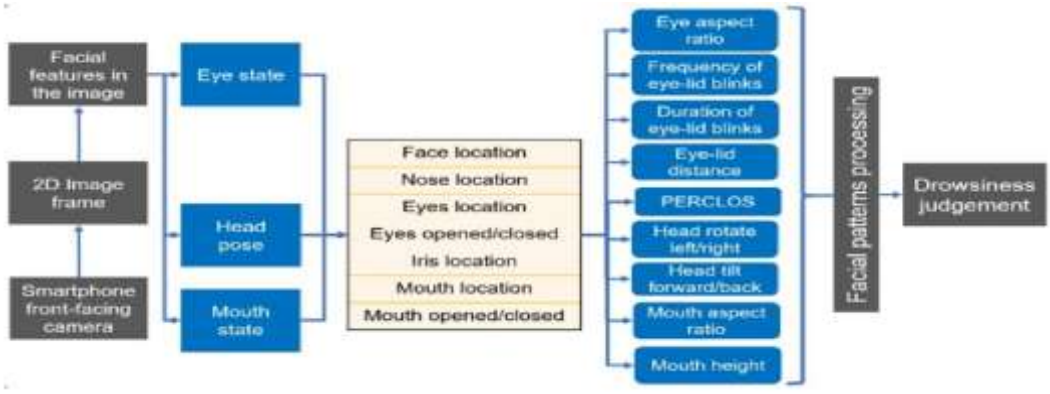

FIGURE 3.5.1 – General scheme for drowsiness state recognition

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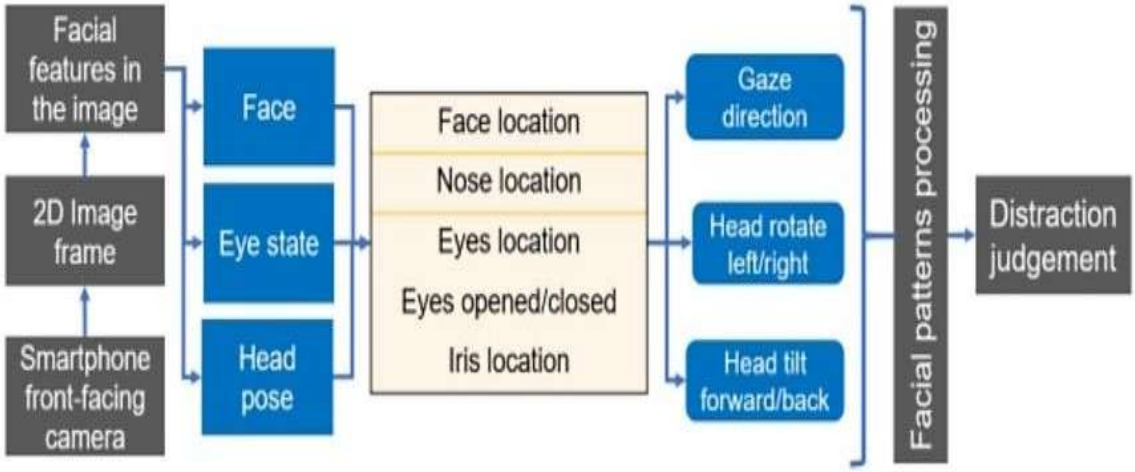
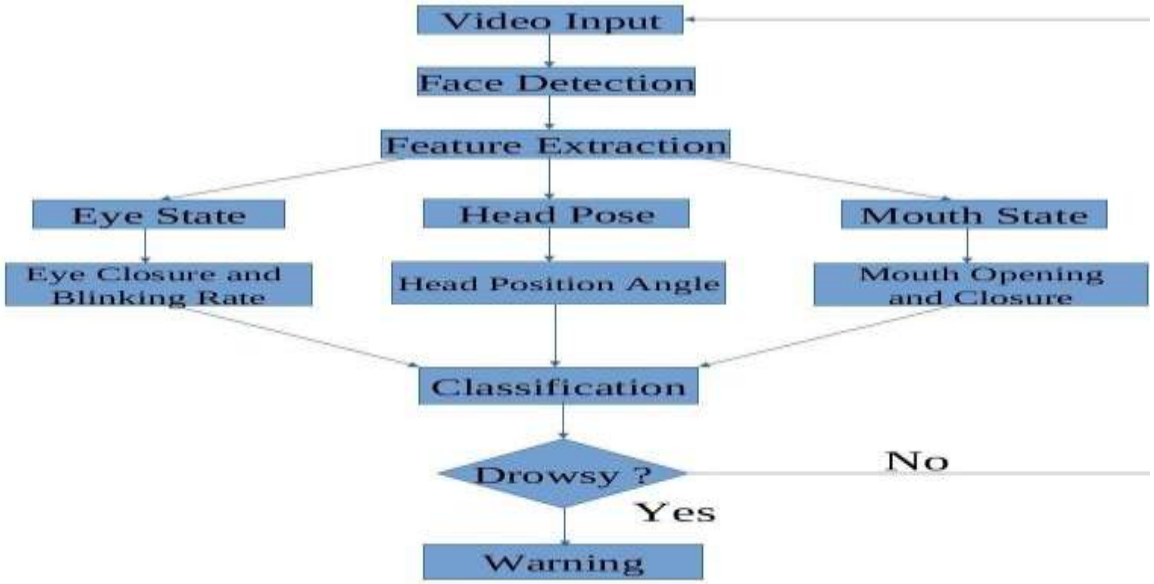


FIGURE – General scheme for distraction state recognition

FLOW DIAGRAM



WORKING PRINCIPLE:

- There are various approaches to improve the street security for a vehicle driver. I tought to be noticed that one of the gigantic mainstream approaches introduced in past logical explores depends in the improvement of cutting-edge driver elp frameworks.
- These well being frameworks permit to diminish street mishaps and furnish better collaboration and commitment with a driver. Some normal instances of driver security advancements for this sort of frameworks are vehicle impact shirking framework, path keep partner, driver laziness and interruption observing what's more, cautioning.
- General utilization of such frameworks can be depicted as a certain arrangement of sequential orders along these lines: Observing driver conduct, condition of the vehicle or street circumstance by utilizing distinctive inherent assistant gadgets, including short and long range radars, lasers, lidars, video stream cameras to see the environmental factors; cease less investigation of readings from sensors and deciding risky circumstances while driving; cautioning driver about perceived

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perilous in-lodge and street circumstances; and taking control of the vehicle if driver response isn't adequate or missing.

- Right now, driver security frameworks vigorously depend on information gathered from various in-vehicle sensors.

MACHINE LEARNING

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. **Machine learning focuses on the development of computer programs** that can access data and use it to learn for themselves.The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. **The primary aim is to allow the computers to learn automatically** without human intervention or assistance and adjust actions accordingly.

UNDERSTANDING THE MACHINE LEARNING WORKFLOW

We can define the machine learning workflow in stages.

1. Gathering data
2. Datapre-processing
3. Researching the model that will be best for the type of data
4. Training and testing the model
5. Evaluation

GATHERING DATA

The process of gathering data depends on the type of project we desire to make ,if we want to make an ML project that uses real-time data, then we can build an IoT system that using different sensors data. The data set can be collected from various sources such as a file, database, sensor and many other such sources but the collected data cannot be used directly for performing the analysis process as there might be a lot of missing data, extremely large values, unorganized text data or noisy data. Therefore ,to solve this problem Data Preparation is done. We can also use some free data sets which are present on the internet. Kaggle and UCI Machine learning Repository are there positories that are used the most for making Machine learning models. Kaggle is one of the most visited websites that is used for practicing machine learning algorithms, they also host competitions in which people can participate and get to test their knowledge of machine learning.

DATA PRE-PROCESSING

Datapre-processing is one of the most important steps in machine learning. It is the most important step that helps in building machine learning models more accurately. In machine learning, there is an 80/20rule.Every data scientist should spend 80% time for data per-processing and 20% time to actually perform the analysis.

RESEARCHING THE MODEL THAT WILL BE BEST FOR THE TYPE OD DATA

Our main goal is to train the best performing model possible, using the pre-processed data.

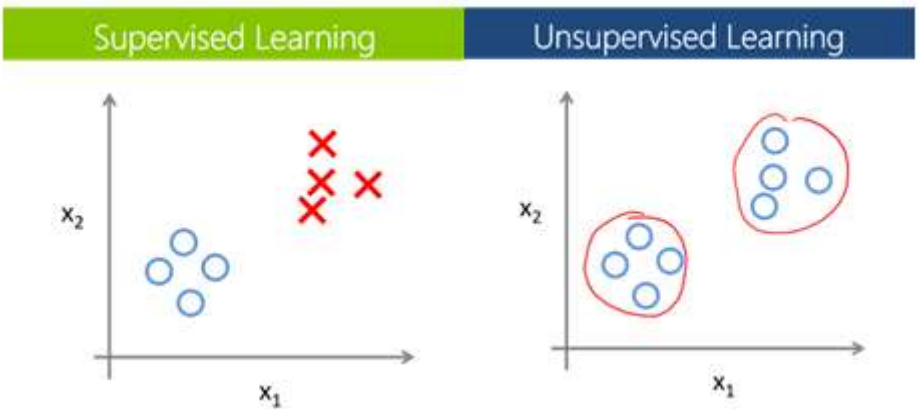

FIGURE – Supervised and Unsupervised Learning

SupervisedLearning:

In Supervised learning, an AI system is presented with data which is labelled, which means that each data tagged with the correct label. The supervised learning is categorized into 2 other categories which are "**Classification**" and "**Regression**".

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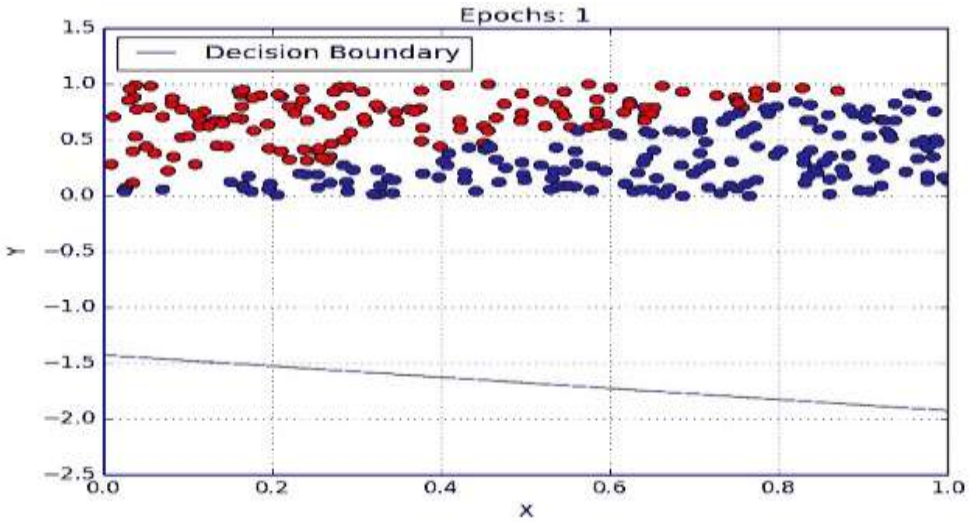

FIGURE – Classification

Regression:
While a **Regression** problem is when the target variable is **continuous** (i.e. the output is numeric).

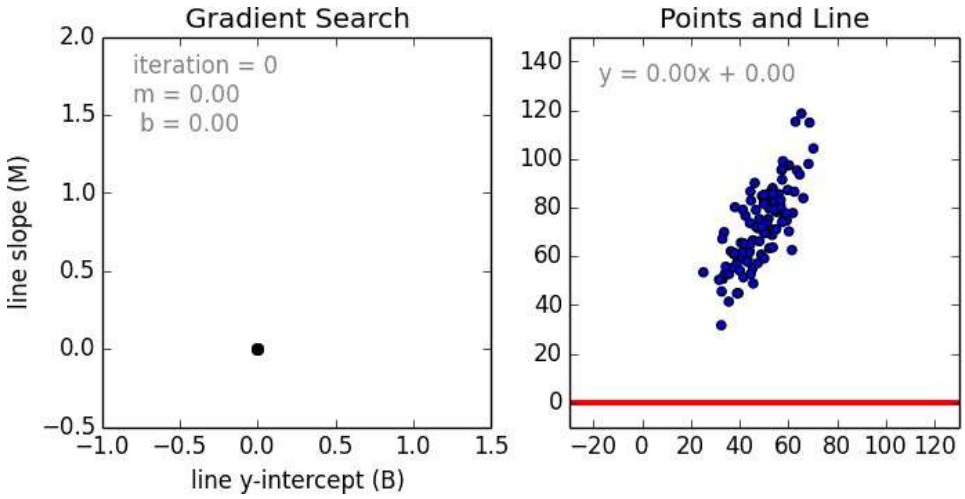

FIGURE 4.1.3.3 – Regression

METHODS OF UNSUPERVISED LEARNING
The unsupervised learning is categorized into 2 other categories which are "**Clustering**" and "**Association**".

Clustering

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A set of inputs is to be divided into groups. Unlike in classification, the groups are not known before hand, making this typically an unsupervised task.

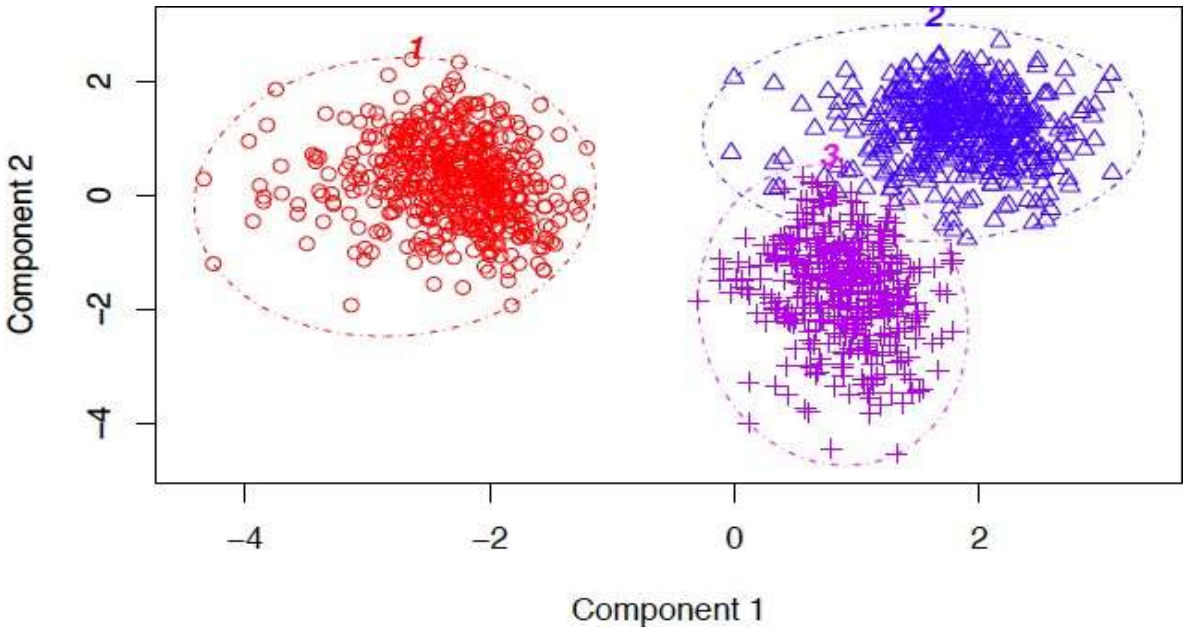

FIGURE – Clustering

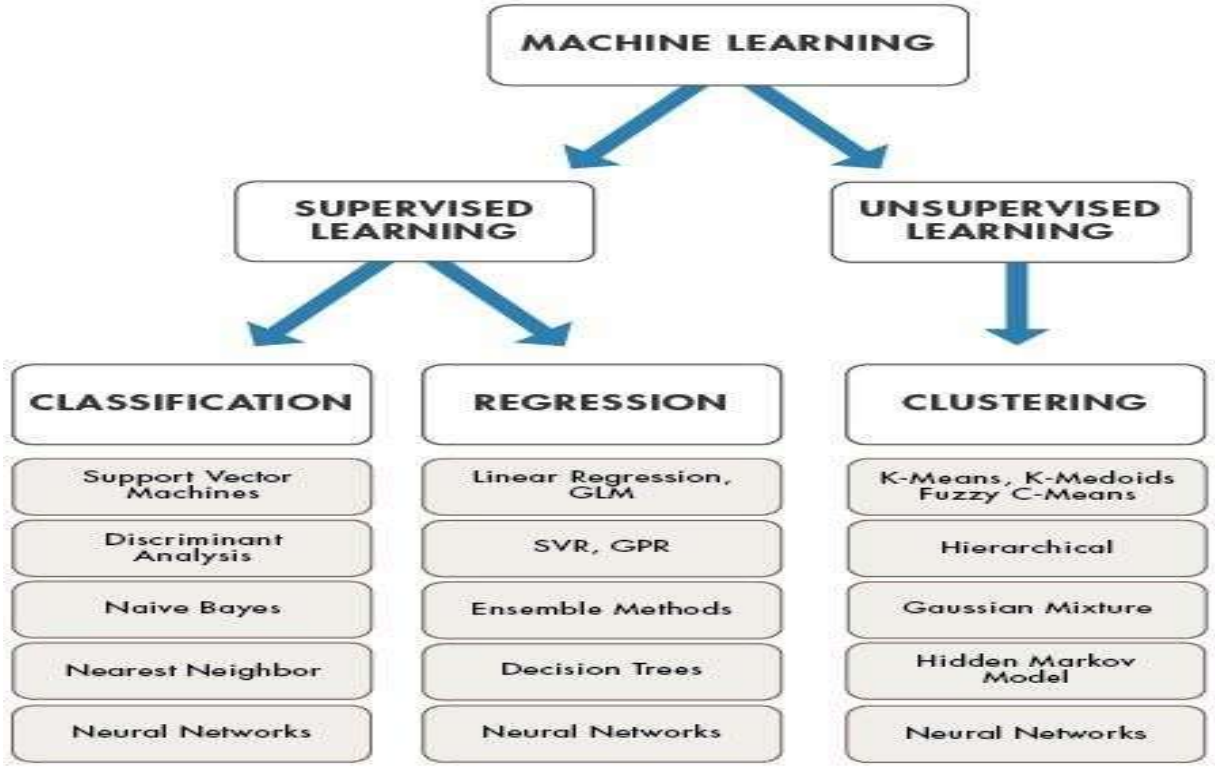

FIGURE –Overview of model under categorie

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III. METHODS AND ALGORTHIM

EYE ASPECT RATIO

The Eye Aspect Ratio is an estimate of the eye-opening state.he eyes aspect ratio can be defined by the belowequation**.** A program can determine if a person' s eyes are closed if the Eye Aspect Ratio falls below a certain threshold.

FORMULA

$$EAR = \frac{\|P2-P6\|+\|P3-P5\|}{2\|P1-P4\|}$$

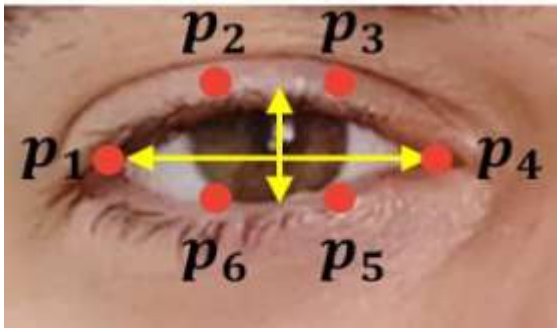
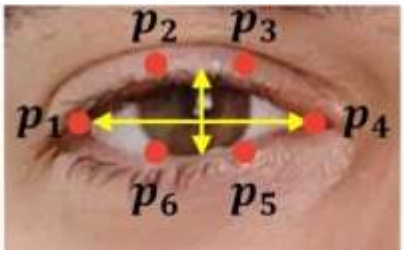


FIGURE 5.1.1 – EAR open eye landmarks

Eye aspect ratio will be larger and relatively constant over time when eye is open



Eye aspect ratio will be almost equal to zero when a blink occurs

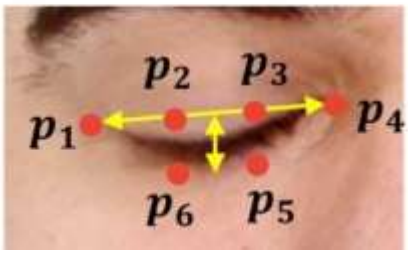


FIGURE 5.1.2 – EAR open and closedeye landmarks

FACIAL LAND MARK

Facial Landmark- It is a inbuilt HOG SVM classifier used to determine the position of 68(x, y) coordinates that map to facial structures on the face

It is mainly used for image or video processing and also analysis including object detection, facedetection, etc. Facial landmarks are used to localize and represent important regions of the face,suchas: ·Mouth.·Eyes.·Eyebrows.

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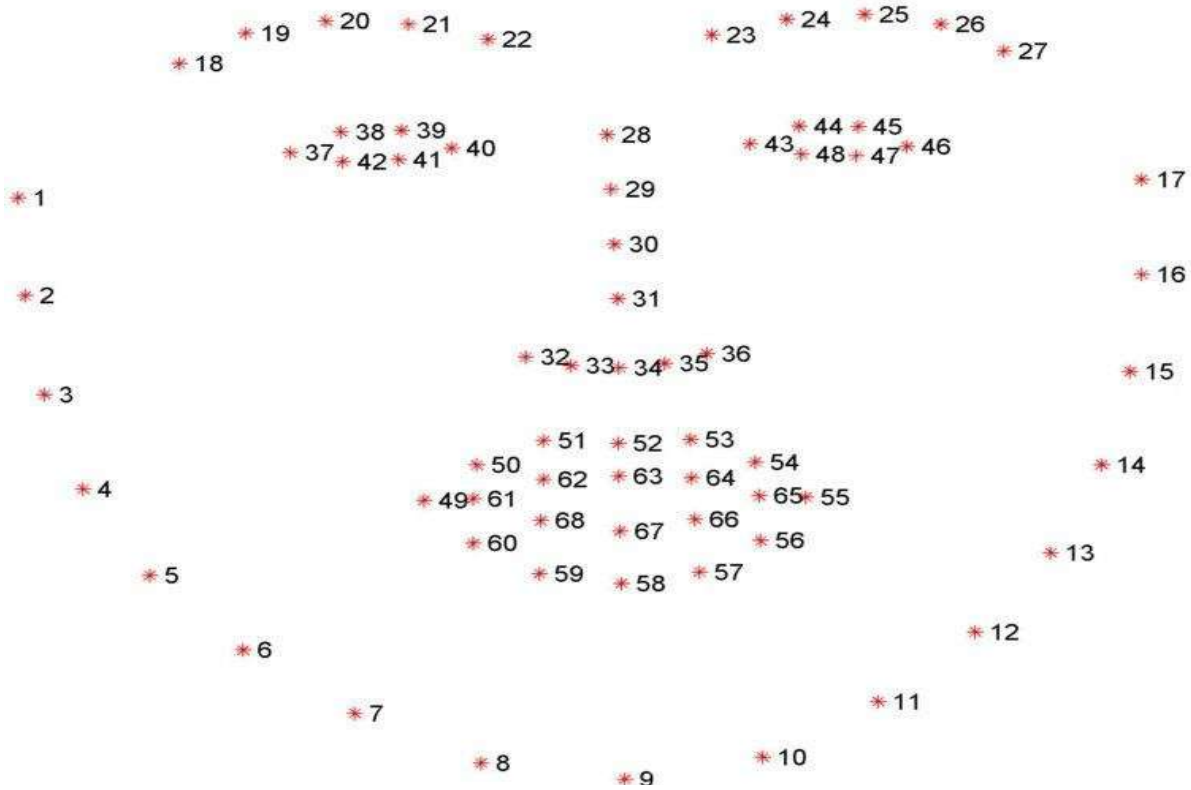


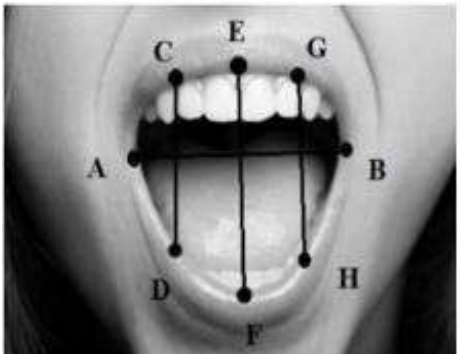
FIGURE 5.2.1 – Facial Landmark coordinates

MAR(MOUTH ASPECT RATIO)

Using this concept, we have calculated the Mouth Aspect Ratio: Representing the face with 68-(x,y) coordinates. As we see that them out his represented by asset of 20-(x,y)coordinates. So,we have used coordinates 62,64,66,and 68 to calculate the distance between then in the same wayas EAR Calculation.

MAR=|CD|+|EF|+|GH|

3*|AB|



$$MAR = \frac{|EF|}{|AB|}$$

FIGURE – MAR coordinates

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IV. RESULT

- The driver anomaly observing framework created is able of identifying aziness, intoxicated and careless practices of driver in a brief time.
- The Laziness Detecting Framework created based on eye closure of the driver can separate ordinary eye flicker and tiredness and distinguish the laziness while driving.
- The suggested device is able to avoid the incidents when driving due to sleepiness. The system works properly even in case of drivers sporting spectacles and even below low light stipulations if the digital camera offers higher output.
- Information about the head and eyes position is obtained through a range of self-developed photograph processing algorithms. During the monitoring, the system is able to figure out if the eyes are opened or closed.
- When the eyes have been closed for too long, a warning sign is issued. Processing judges the driver's alertness level on the ground work of continuous eye closures.

FIGURE – DDD System output Image

V. CONCLUSION

- The driver anomaly observing framework created is able of identifying laziness, intoxicated and careless practices of driver in a brief time. The Laziness Detecting Framework created based on eye closure of the driver can separate ordinary eye flicker and tiredness and distinguish the laziness while driving.
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