International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 05 | May 2021 www.irjet.net p-ISSN: 2395-0072

Driver Drowsiness Detection System by Measuring EAR and MAR

Aditya Chaurasiya[1], Siddhi Sonsale[2], Ankur[3], Radhika Daga[4], Mr. Abhijit Patankar[5]

[1]*Information Technology, D.Y Patil College of Engineering, Akurdi, Pune, India.*
[2] *Information Technology, D.Y Patil College of Engineering, Akurdi, Pune, India.*
[3]*Information Technology, D.Y Patil College of Engineering, Akurdi, Pune, India.*
[4]*Information Technology, D.Y Patil College of Engineering, Akurdi, Pune, India.*
[5]*Professor, Information Technology, D.Y Patil College of Engineering, Akurdi, Pune, India.*

Abstract - *The primary thought behind this task is to foster a non-intrusive framework which can identify drowsiness of any human and can give a convenient admonition. Drivers who don't take normal breaks when driving significant distances run a high danger of getting languid a state which they frequently neglect to perceive adequately early. As indicated by the master's contemplates show that around one fourth of all genuine motorway mishaps are owing to lethargic drivers needing a rest, implying that sluggishness causes more street mishaps than drink-driving. This framework will screen the driver eyes and mouth utilizing a camera and by fostering a calculation we can identify side effects of driver exhaustion early to stay away from the individual from resting and furthermore by utilizing KCF calculation we will improve execution in helpless lightning conditions. Along these lines, this task will be useful in recognizing driver exhaustion ahead of time and will give cautioning yield in type of alert what's more, pop-ups.*

Also, the admonition will be deactivated physically instead of naturally. For this reason, a de-enactment exchange will be created which will contain a few straightforward numerical activities which when addressed accurately will excuse the caution. Additionally, if driver feels languid there is plausibility of inaccurate reaction to the exchange. We can pass judgment on this by plotting a chart in time space. On the off chance that all the three input factors show a chance of weakness at one second, at that point a Warning sign is given in type of text and sound. This will straightforwardly give a sign of tiredness/exhaustion which can be additionally utilized as record of driver execution.

***Key Words*: Drowsiness, KCF, Driver, exhaustion, sluggishness, non-intrusion.**

1.INTRODUCTION

Driver drowsiness area is a vehicle security development which neutralizes disasters when the driver is getting tired. Various assessments have recommended that around 20% of all road accidents are shortcoming related, up to half on explicit roads. Driver depletion is a basic factor in a broad number of vehicle disasters. Progressing experiences measure that yearly 1,200 passing and 76,000 injuries can be credited to shortcoming related mishaps. The improvement of advancements for recognizing or expecting laziness in the driver's seat is a critical test in the field of disaster evading structures. Because of the threat that drowsiness presents all over town.

1.1 Drowsiness

Drowsiness is characterized as a diminished degree of mindfulness depicted by lethargy and inconvenience in remaining alert however the individual rises and shines with basic energy by upgrades. It may be brought about by a shortfall of rest, medication, substance abuse, or a cerebral issue. It is for the most part the consequence of exhaustion which can be both mental and physical. Actual weakness, or muscle exhaustion, is the brief actual disappointment of a muscle to perform in a perfect world. Mental weariness is a transitory inability to keep up ideal mental execution. The point is to gather the Drowsiness indications from the driver's face through examination of the driver's eye state, yawning (Mouth Aspect proportion). This will be accomplished through handling video pictures by OpenCV and improving the performance in poor lightning conditions by utilizing KCF Tracker. The result of the video will be utilized to decide the laziness levels and afterward give an admonition to the driver on the off chance that he/she is Drowsy.

2. LITERATURE SURVEY

Past ways to deal with laziness discovery essentially make pre-presumptions about the significant conduct, Eye squinting recurrence, yawn recurrence, Head developments. However, it has a detriment that if an individual is talking or keeping its mouth open for a more extended time frame and still, at the end of the day likewise it will discover it as feeling languid. Here we utilize Computer vision-based procedure which discovers the eyes and mouth on any grayscale picture via looking through trademark highlights of the eyes, eye attachments and yawning factor.

2.1 Existing System

Exhaustion driving is alluding to the driver in quite a while nonstop driving or physical weakness condition, and after that appear physiological and mental capacity issue, prompted a decrease in driving capacity. Gone for the necessities of observing on the weakness driving, this article planned a driver weariness screen framework

basedSTM32F407 of ARM as a controller, it used to decide the driver's exhaustion and diminish the auto collision. The upside of PC vision techniques is that they are non-meddlesome, and along these lines are logically sensible to use by the general populace. There are some enormous past examinations about tiredness acknowledgment using PC vision strategies. A huge segment of the circulated research on Computer vision approaches to manage disclosure of sluggishness has focused on the examination of squints and head improvements. It has been considered that these drivers demonstrate certain physiological models that are typical and detectible. The standard "head weaving" improvement, where the driver's head drops and after that rapidly pulls back upward is one of the models that is frequently indicated when an individual is getting the chance to be tired while arranged in an upstanding position.

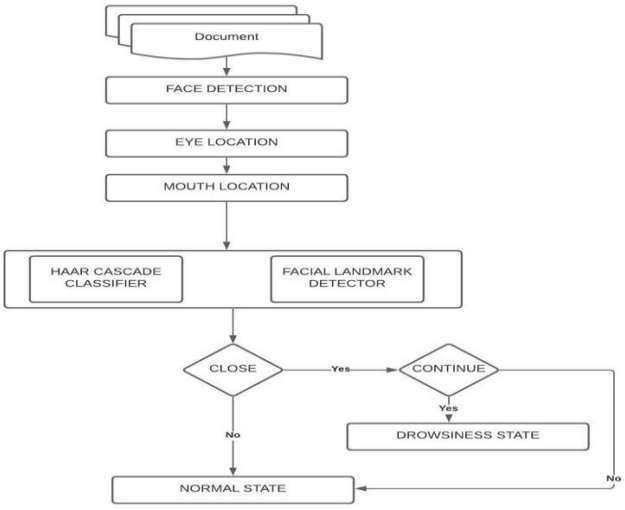
2.2 Proposed System

Exploration has perceived a couple of signs or results which help in choosing the drained state of the driver.
These signs or results are the going with:

- Staring off into space and nonappearance of concentrating.
- Flickering sometimes and deficiently shut eye.
- Yawning after every little period.
- Floating or maybe move out from the way.

3. ARCHITECTURE

The framework configuration measure develops the new system is sluggishness revelation structure for the vehicle. Through examination of the eye communicates, yawning and head hub in the system will presumably tell a lethargic driver from a commonplace driver.



A video transfer will be reliably procured from the driver's appearances and feed into a miniature regulator for getting ready. Classifiers will at that point be used to bunch the state of the driver's eye, mouth and head. If a languid driver is perceived an alert will be raised, until the system sees the driver is ready.

The interaction includes the accompanying advances:

Image Capture

Using a web camera showed inside the vehicle we can get the image of the driver. Not-withstanding the way in which that the camera makes a video cut, we need to apply the computation on each edge of the video stream to get the edges for the further technique.

Partitioning into Frames

It is sorted out some way to get the predictable circumstance where video is recorded and ought to be prepared. Be that as it might, the video isn't which is used at the same time so it is changed over into picture. Henceforth the video should be divided into edges for investigating.

Face Recognition

In this stage it is perceived that the district containing the pith of the driver. A predefined tally is for space of face in each bundling. By face affirmation we surmise that discovering the face in an edge or continuously end discovering zone of facial characters through a sort of progression with the utilization of PC. The bundling might be any emotional bundling. Essentially facial related constructions or highlights are perceived and all others kinds of articles like structures, tree, bodies are disregarded.

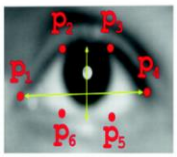
Eye Detection

After affirmation of face eye should be recognized for additional dealing with. In the strategy eye is the choice boundary for discovering the condition of driver. Despite the way that conspicuous verification of eye might be less mind boggling to find, in any case it's actually angled. By and by it plays out the space of eye in the required unequivocal area with the utilization of affirmation of a few highlights. Everything considered Eigen approach is utilized for this approach.

Eye perspective proportion (EAR)

From the eye corner focuses, the eye perspective proportion is determined as the proportion of stature and width of the eye as given by:

EAR formulae:

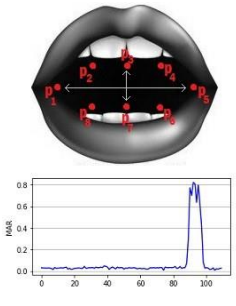


$$\mathrm{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

Similarly, the actions are taken from the Mouth that is by utilizing Mouth Opening Ratio (MOR), and furthermore the head gesturing is determined. In the wake of recognizing the facial milestones.

Mouth opening proportion (MAR):

Mouth opening proportion is a boundary to recognize yawning during sleepiness. Like MAR, it is determined as:



$$\mathrm{MAR} = \frac{\|p_2 - p_8\| + \|p_3 - p_7\| + \|p_4 - p_6\|}{2\,\|p_1 - p_5\|}$$

4.METHODOLOGY

By and large, the techniques to distinguish drowsy drivers are ordered in three sorts; vehicle based, social based also, physiological based. In Vehicle based strategy, a number of measurements like guiding wheel development, gas pedal or brake design, vehicle speed, parallel speed increase, deviations from path position and so on are checked consistently. Discovery of any unusual change in these qualities is considered as driver tiredness.

4.1 Pseudo Code

Step 1: Start
Step 2: Initialize the camera
Step 3: Predict Facial landmarks
Step 4: Extract Eye and Mouth Region
Step 5: Scale the input for performance optimization using KCF Tracker
Step 6: Check the threshold value for EAR and MAR
Step 7: If Over Threshold, Then
Step 8: Alert the driver with buzzer sound
Step 9: Else, continue to capture frames

4.1 Algorithm Used

HOG + Linear SVM (Using Dlib)

Dlib is a general-purpose cross-platform software library written in the programming language C++.Its design is heavily influenced by ideas from design by contract and component-based software engineering. Thus, it is first and foremost, a set of independent software components. It is opensource software released under a Boost Software License.
Since development began in 2002, Dlib has grown to include a wide variety of tools. As of 2016, it contains software components for dealing with networking, threads, graphical user interfaces, data structures, linear algebra, machine learning, image processing, data mining, XML and text parsing, numerical optimization, Bayesian networks, and many other tasks. In recent years, much of the development has been focused on creating a broad set of statistical machine learning tool.

The pre-trained facial landmark detector inside the dlib library is used to estimate the location of 68 (x, y) coordinates that map to facial structures on the face.

Euclidean Algorithm

It is only a distance measure between a couple of tests p and q in a n-dimensional element space:

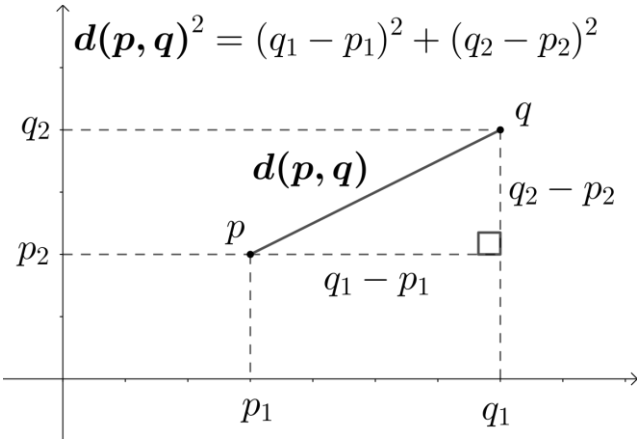
$$d(\mathbf{p},\mathbf{q}) = d(\mathbf{q},\mathbf{p}) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \cdots + (q_n - p_n)^2}$$
$$= \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}.$$

Concerning Euclidean calculation, an assessment is made in one assessment by fixing two on a line, and picking one to be the root.

The length of the line part between these centers portrays the unit of bundle and the heading from the inspiration to the subsequent point is depicted as the positive bearing. This line section may be made an explanation of along the line to manufacture longer divides whose lengths identify with eventual outcomes of the unit isolated.

The subsequent point is then astoundingly picked as the point on hold that is at a unit of one certain unit from the soonest beginning stage put together.

The division between any two on the certified line is the firm assessment of the mathematical difference of their direction. It is completely expected to see the name of a point with its Cartesian help.



KCF Algorithm

Focusing on the issue that the customary bit relationship channel (KCF) following calculation can't re-recognize the objective, when the objective is absent because of brightening variety, extreme impediment, and out of view, this paper prompts the oddity discovery technique as the objective misfortune cautioning instrument dependent on KCF, and simultaneously, an objective misfortune re-location system is proposed. This strategy distinguishes the pinnacle worth of the reaction of each casing. On the off chance that the strange pinnacle esteem is discovered, the objective is lost or will be lost. At that point, the admonition component cautions, the objective format update is halted, the objective misfortune re-identification instrument is begun and tracks the objective in full edge search. The test results show that the accuracy of the improved calculation is 0.751, and the achievement rate is 0.579, which is 5.77% and 12.43% higher than that of the customary KCF following calculation, separately. This tackles the issue that the KCF tracker can recuperate the objective to continue to follow after the objective is lost, the exhibition of the following calculation is improved, and the drawn-out following is figured it out.

5. IMPLEMENTATION AND RESULTS

This Chapter contains the detailed design and implementation of the project including the result:

5.1 Software platform

OpenCV

OpenCV (Open-Source Computer Vision) is a library of programming limits generally went for constant PC vision. In clear language it is library utilized for Image Handling. It is by and large used to do all the endeavor identified with Images.

OpenCV supports the significant learning structures TensorFlow, Torch/PyTorch and Caffe. Fundamentally there are four modules.

Python 3.8

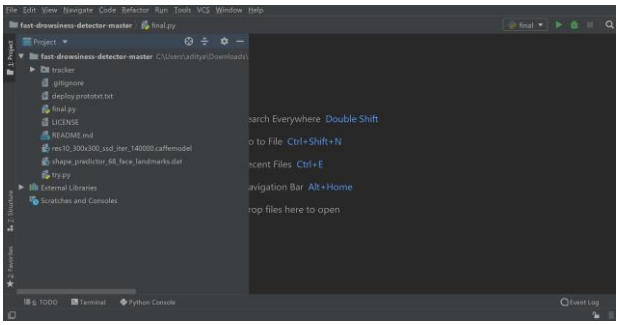
There are now newer bugfix releases of Python 3.7 that supersede 3.7.5 and Python 3.8 is now the latest feature release of Python 3.

PyCharm

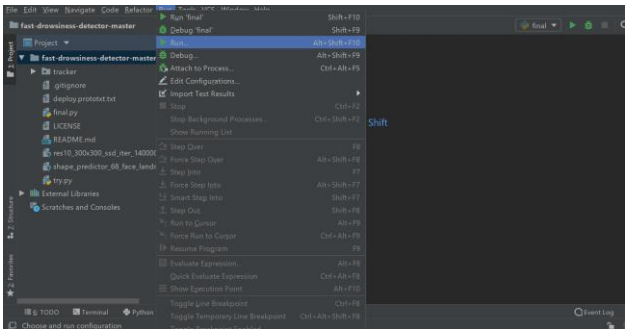
PyCharm is an integrated development environment used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains.

Steps for Running the Application

1.Open PyCharm IDE

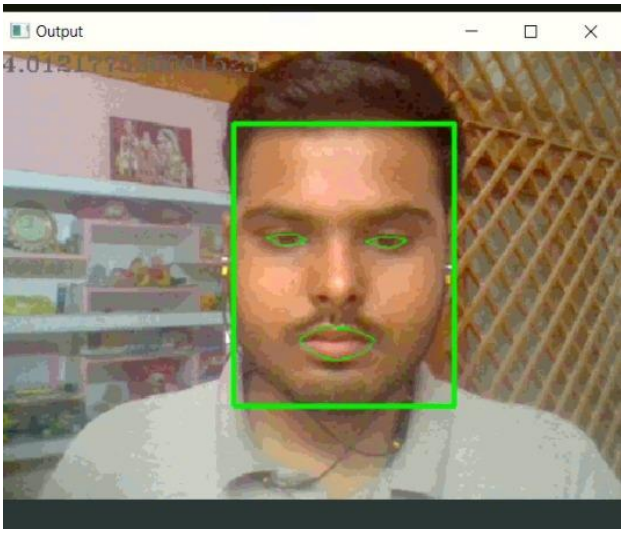


2.Right Click on Project

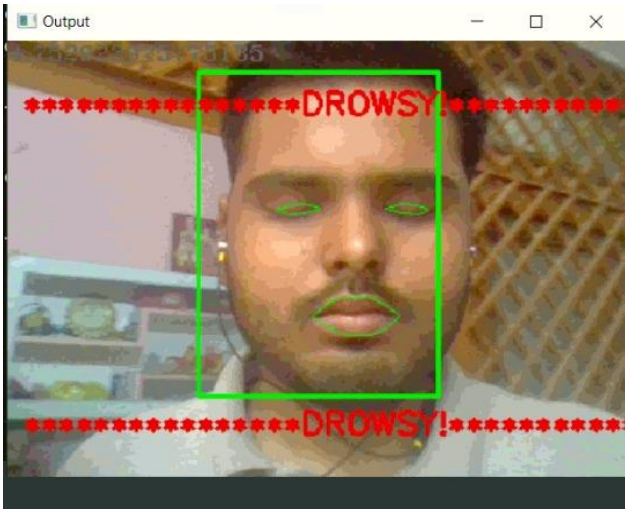


3.Then, Click on Run
4.Camera frame will open and capture the Video
5.Output can be seen in the same Frame
6.To stop the application Press q on Terminal or Stop the execution.

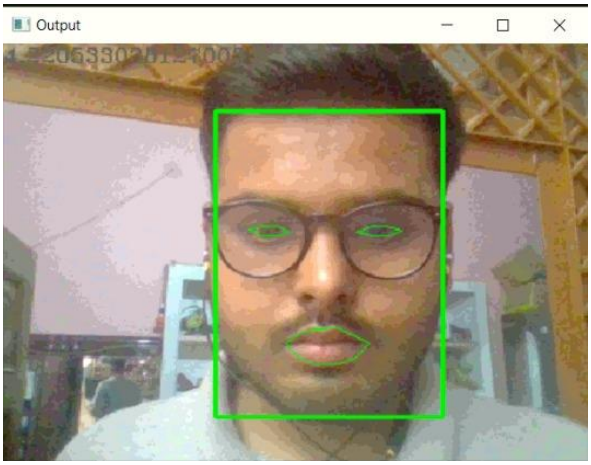
5.2 Results



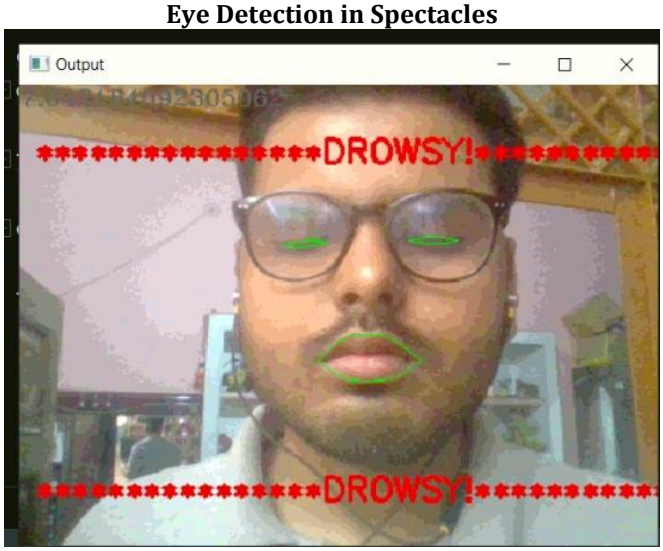
Normal Condition



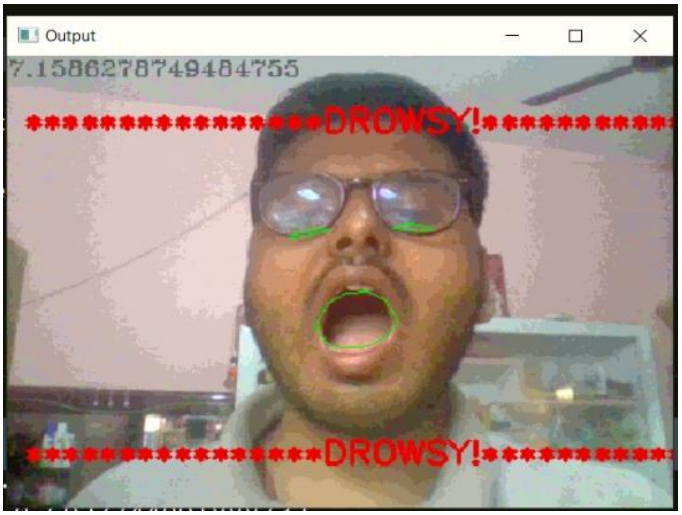
Drowsy Detection



Eye Detection in Spectacles



Drowsy Detection in Spectacles



Drowsy Detection when Yawning

6. CONCLUSIONS

The structure is made which apportions and tracks the eye Aspect Ratio, Mouth Aspect Ratio and head advancements of the driver in order to recognize sluggishness.

The structure uses a blend of format – based organizing what's more, feature based organizing to confine the eyes. During following, structure will doubtlessly pick if the eyes are open or closed and whether the driver is glancing in front. Exactly when the eyes will be closed for a truly long time, a notification sign will be given as chime or caution message.

ACKNOWLEDGEMENT

I would like to thank Mr. Abhijit Patankar (Asst Prof, Dept of IT, DYPCOE, Akurdi Pune) for his valuable suggestions and comments that helped improving this works, this support is greatly appreciated.

REFERENCES

[1] World Health Organization, Global status report on road safety: summary. World Health Organization, 2009 Available: http://books.google. com/books

[2] Global Status Report on Road Safety 2013: Supporting a Decade of Action: Summary. World Health Organization,2013. http://books.google.com/books?id=qzK2nQEACAAJ

[3] Facial Recognition Using Deep Learning https://towardsdatascience.com/facial-recognition-using-deep-learning-a74e9059a150

[4] Eye Blink Detection Algorithms https://hackaday.io/project/27552blinktotext/log/68360-eye-blink-detection-algorithms