

Real-Time Driver Behaviour Monitoring System Invehicles Using Image Processing

Assistant Prof. Deepak Patil, Vaibhav Lokhande, Prathamesh Patil, Parth Patil, Saurabh Gaikwad

*Department of Information Technology,
Dr. D Y Patil Institute of Technology, Pimpri-Pune, Maharashtra, India.*

Submitted: 15-05-2022

Revised: 25-05-2022

Accepted: 28-05-2022

ABSTRACT: Mishchances happen all over the world cause of being not able to concentrate on the street whereas driving. The concentration is missed due to tiredness, diversion whereas driving or driving the car without resting which makes the individual lazy. Each year the number of passings and wounds are expanding in activity mishaps due to human mistakes. 20% of all activity mishchances are due to the reduced level of consideration caused by weariness or utilizing mobile phones and it can lead to genuine physical wounds, misfortune of human life, harm to property and misfortune of money. When a individual gets occupied whereas driving, the hazard of getting into a mishap is tall. perfect way">The most perfect way to avoid mishchances caused by driver's botches is to screen the behaviour of the driver i.e., checking driver's fatigueness, diversion, tiredness, facial acknowledgment and versatile dealing with. This venture is based on ponder the effectiveness of Picture Handling and computer vision strategies for confront discovery of driver.

Index Terms–Real Time Drivers Monitoring, Behaviour Monitoring System, ,Open CV, Alert System , SVM,

I. INTRODUCTION

Every year the number of deaths and injuries are increasing in traffic accidents due to human errors. Now a days, after alcohol, drowsiness, distraction and using mobile phone while driving are the leading causes of road accidents. When a person is driving while feeling sleepy or gets distracted, the risk of getting into an accident is pretty high. This problem can be reduced if we detect the driver's mistake while driving the car and alert the driver. The best way to avoid accidents caused by driver's mistakes is to monitor the behaviour of the driver. Our whole focus and concentration will be placed on designing the system that will accurately monitor

the driver's fatigueness, drowsiness, distraction, facial emotion recognition and mobile phone handling.

When a individual is driving whereas feeling languid or gets diverted, the chance of getting into an mishchance is lovely high.

The best way to dodge mishchances caused by driver's botches is to screen the behavior of the driver.

Our entirety center and concentration will be set on planning the framework that will precisely screen the driver's fatigueness, laziness, diversion, facial feeling acknowledgment and portable phone dealing with.

II. LITERATURE REVIEW

Title: "Driver Drowsiness Monitoring based on Yawning Detection "

Author name: ShabnamAbtahi, Behnoosh Hariri, ShervinShirmohammadi

DescriptionWeakness and tiredness of drivers are among the noteworthy causes of street mishchances. This work states the strategy for identifying drivers' tiredness and in this way cautioning them. The point of this extend is to decrease the number of mishaps due to drivers weakness and subsequently increment the transportation security. Numerous uncommon body and confront motions are utilized as sign of driver weakness, counting yawning, eye tiredness and eye development, which demonstrate that the driver is now not in a appropriate driving condition. Here, framework proposed a strategy of yawning location based on the changes within the mouth geometric highlights.

Title: "Head movement-based driver drowsiness detection: A review of state-of-art techniques"

Author name: Ajay Mittal, Kanika Kumar, SarinaDhamija, Manvjeet Kumar

Description: Driver weariness is one of the foremost common reasons for dangerous street mishaps around the world. Ceaseless repetitive driving for long hours without rest causes drowsiness and subsequently lethal street mischances. Programmed driver laziness location can prevent a tremendous number of rest induced street mischances, and subsequently can spare valuable lives. Number of strategies for driver tiredness detection has been inspected within the later past. This venture presents an overview of these strategies. These procedures identify the driver drowsiness by watching the driving design. An anomaly in driving design is hypothesized as a laziness state of driver. Different measures such as subjective, behavioral, physiological, and vehicular have been utilized for this reason. The comparative analysis of these strategies demonstrates that behavioral measures are simple to secure and does not irritate the driver as they are non-invasive. Among different behavioral measures, head movement degree is found to be .

Title: "Facial Expression Recognition"

Author name: Hazarmliki ,NesrineFourati and Souhailsmaoui

Description: in this paper present a unused approach to consequently classify facial expression to begin with distinguish facial highlights, eyes eyebrows and mouth utilizing vertical and level projection. Two

Approaches utilized whereas acknowledgment facial expression I) Feature Approach II) Model-based strategy this approaches guarantee completely programmed arrangement to identify human expression as well as rising over facial highlights component.

Title: "Mobile phones use a growing problem of driver distraction"

Author name: Krstolipovac, milantesic and zoranandric

Description: : Diversion driving could be a genuine and developing string to street security. Distributed comes about of the investigate into the association between portable phones utilize whereas driving activity security. Considers from a number of nations suggest that extent of drivers utilizing versatile phones whereas driving has expanded over the past 5-10 a long time. Innovation frameworks inside vehicle

can too be utilized to secure against diversion more for the most part for e.g., caution highlights that caution the driver of sudden path departures may serve to decrease wounds related to diversion.

Title: "Towards Detection of Bus Driver Fatigue Based on Robust Visual Analysis of Eye State"

Author name: B.Mandal, L.Li, G.S.Wang and J.Lin

Description: This work states the methods like EEG, EOG, EMG, ECG are meddling since sensors are required to be put on the driver's body in arrange to gather the information. A few of the sensors ended up suitable for recognizing tiredness like heart rate, beat rate. But the issue is causing annoyance due to require terminals to be connected to drivers. So, this gets to be uncomfortable for driver to drive the car wearing those gadgets and the most thing is that there may be a few varieties in sensor esteem and divert driver's consideration from driving. The change within the sensor esteem can cause undesirable perplexity to the driver and the sensor side. Thus, this framework gives irregular comes about which isn't appropriate for identifying the lazy state of the driver

III. TECHNOLOGY USED

3.1PYTHON:Python gives different libraries for picture and video handling. One of them is OpenCV. OpenCV may be a tremendous library that makes a difference in giving different capacities for image and video operations. With OpenCV, able to capture a video from the camera. It lets you create a video capture protest which is accommodating to capture recordings through webcam and after that you'll perform craved operations on that video.

3.2OPEN CV:OpenCV (Open Source Computer Vision Library) is an open-source computer vision and machine learning program library. OpenCV was built to supply a common framework for computer vision applications and to quicken the use of machine discernment within commercial items. Being a BSD-licensed item, OpenCV makes it simple for businesses to utilize and alter the code.

3.3SVM:Support Vector Machine or SVM is one of the foremost prevalent Directed Learning calculations, which is utilized for Classification as well as Relapse issues. Be that as it may, fundamentally, it is utilized for Classification issues in Machine Learning.

3.4DLIB:The dlib library is ostensibly one of the foremost utilized bundles for confront acknowledgment. A Python bundle suitably named face_recognition wraps dlib's confront acknowledgment capacities into a straightforward, simple to utilize API. The dlib library gives two functions for confront detection. The primary one could be a HOG + Linear SVM confront finder, and the other may be a profound learning MMOD CNN confront locator

3.5Other components used:Camera , 16X2 LED display, Buck Converter, Buzzer, LED bulbs, etc.

IV. SYSTEM DESCRIPTION

Driver's Behavior Monitoring System monitors driver's behavior by capturing the movement of the driver. The proposed system evaluates driver's mind become active or not by accurately monitoring driver's behavior. This system is based on study the effectiveness of Image Processing and Computer Vision techniques for face detection of driver. The working of the system is to detect the driver's face using Haar Cascade algorithm. 68 facial point expressions library is used for emotion detection. Therefore, the system discussed here is used to monitor the driver and helps the driver to be alert while driving.

The proposed System consists of module:

- Python:
Python is a general-purpose programming language started by Guido van Rossum, which became very popular in short time mainly because of its simplicity and code readability. It enables the programmer to express his ideas in fewer lines of code without reducing any readability. Compared to other languages like C/C++, Python is slower. But another important feature of Python is that it can be easily extended with C/C++. This feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper for it so that we can use these wrappers as Python modules. This gives us two advantages: first, our code is as fast as original C/C++ code (since it is the actual C++ code working in background) and second, it is very easy to code in Python. This is how OpenCV-Python works, it is a Python wrapper around original C++ implementation. And the support of NumPy makes the task easier.

NumPy is a highly optimized library for numerical operations. It gives a MATLAB-style syntax. All the OpenCV array structures are converted to-and-from NumPy arrays. So whatever operations you can do in NumPy, you can combine

it with OpenCV, which increases number of weapons in your arsenal. Besides that, several other libraries like SciPy, Matplotlib which supports NumPy can be used with this. So OpenCV-Python is an appropriate tool for fast prototyping of computer vision problems.

- Image Processing:
Image Processing is described as a method to convert the normal into digital image. So that some operations will be performed on it to get some useful information from the image which is a very good process to find the drowsiness. Image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. The acquisition of images is referred to as imaging. Closely related to image processing are computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, environments, and lighting, instead of being acquired from natural scenes, as in most animated movies.

- OpenCV-Python:
OpenCV introduces a new set of tutorials which will guide you through various functions available in OpenCV-Python. This guide is mainly focused on OpenCV 3.x version (although most of the tutorials will work with OpenCV 2.x also). A prior knowledge on Python and NumPy is required before starting because they won't be covered in this guide. Especially, a good knowledge on NumPy is must to write optimized codes in OpenCV-Python..

V. ALGORITHMS

5.1Haar-cascade Detection in OpenCV:

OpenCV comes with a trainer as well as detector. If you want to train your own classifier for any object like car, planes etc. you can use OpenCV to create one. Here we will deal with detection. OpenCV already contains many pre-trained classifiers for face, eyes, smile etc. Those XML files are stored in OpenCV/data/haarcascades/ folder.

5.2Adaptive Thresholding Algorithm:

Adaptive Thresholding Algorithm is the method where the threshold value is calculated for smaller regions and therefore, there will be different threshold values for different regions. In

OpenCV, you can perform Adaptive threshold operation on an image using the method adaptiveThreshold() of the Imgproc class. The method is used to convert the color image (BGR) to gray scale image. Adaptive thresholding is the method where the threshold value is calculated for smaller regions. This leads to different threshold values for different regions with respect to the change in lighting.

5.368 Facial Points Landmark:

Face landmark detection is the process of finding points of interest in an image of a human face. The face mark detector can work with any image. Landmark detection starts with face detection, finding faces in the image and their bounding boxes. After getting the face position in an image and next we have to find out small features of the face like eyes, eyebrows, lips, mouth etc. Facial landmark points detection through Dlib's 68 Model - There are mostly two steps to detect face landmarks in an image which are given below:

1. Face detection: Face detection is the first methods which locate a human face and return a value in x,y,w,h which is a rectangle.
2. Face landmark: After getting the location of a face in an image, then we have to through points inside of that rectangle.

There are many methods of face detector but we focus in this post only one which is Dlib's method. Like, Opencv uses methods LBP cascades and HAAR and Dlib's use methods HOG (Histogram of Oriented Gradients) and SVM (Support Vector Machine).

5.4 Eye Aspect Ratio:

The Eye Aspect Ratio is an estimate of the eye-opening state. The Eye Aspect Ratio is a constant value when the eye is open, but rapidly falls to 0 when the eye is closed. The person's eyeblinks are obvious. A program determines if a person's eyes are closed & if the Eye Aspect Ratio falls below a certain threshold. Traditional image processing methods for computing blinks which typically involve some combination of:

1. Eye localization.
2. Thresholding to find the whites of the eyes.
3. Determining if the "white" region of the eyes disappears for a period of time (indicating a blink).

The eye aspect ratio is instead a much more elegant solution that involves a very simple calculations based on the ratio of distances between facial landmarks of the eyes. This method for eye blink detection is fast, efficient, and easy to implement.

5.5 Head Pose Estimation:

Head pose estimation means detecting the position of a human head in the image. Particularly, it means detecting the head's Euler angles – yaw, pitch and roll. The main objective of this task is to find the relative orientation (and position) of the human's head with respect to the camera. Head pose estimation is used widely in various computer vision applications- like VR applications, hands-free gesture-controlled applications, driver's attention detection, gaze estimation, and many more.

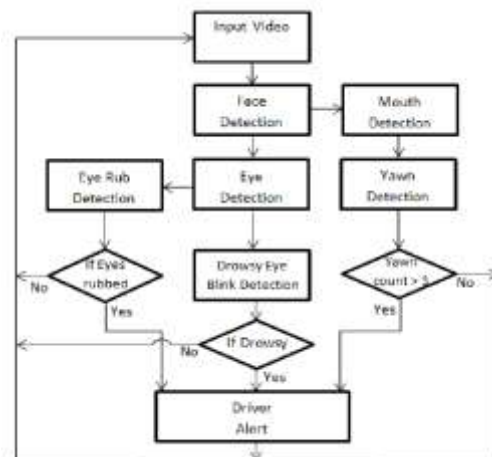


Fig . Architecture

VI. CONCLUSION

A novel strategy is presented which is basic in terms of calculation and will give more exactness compared to existing strategies. The framework is competent of separating a typical squint verses the tiredness. Support Vector Machine may be a double classifier based on administered learning which has exceptionally great effectiveness, produces the exact comes about and gives superior execution than other classifiers. The operations are performed on inactive picture as well on nourish of live webcam. It is watched that, the comes about shift due to un-even lighting condition; in any case, it is exact indeed in moo light conditions. Proposed framework can

be utilized in genuine working environment. In future, smoke discovery, situate belt sensor can be conceivable. Hence, the framework talked about here is utilized to screen driver and makes a difference the driver to be alarm whereas driving.

REFERENCES

- [1]. Prof. B. H. Pansambal, “Real Time Driver Drowsiness Detection system using Image processing,” ISSN : 2494-9150 Vol-02, Issue 08, Nov 2016.
- [2]. Prof. SadiaPatka, “A System to Detect Drowsiness of a Driver while Driving a Vehicle, ” ISSN: 2321- 8169 Volume: 4 Issue: 5 93 – 96. May 2016.
- [3]. Ketan Ramesh Dhakate, “Distracted Driver Detection using Stacking Ensemble, ” IEEE : 2020. [
- [4]. Javedahmed, “ Eye behaviour based drowsiness detection system”, IEEE : 2015.
- [5]. Khadija Lekdioui, “ Facial Expression Recognition Using Face-Regions”, IEEE : May 22-24, 2017.