Driver drowsiness detection system with opencv and keras

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Abstract. Drowsiness of the drivers is the principal cause of injuries in the world. Because of loss of sleep and tiredness, drowsiness can occur even as riding. The first-rate manner to keep away from accidents because of drivers’ drowsiness is to come across drowsiness of the driving force and warn him before fall into sleep. To discover drowsiness many techniques like eye retina detection, facial function recognition has been used. Here on this paper, we suggest a way of detecting motive force drowsiness, the usage of eye retina detection and pulse charge detection of the driving force. On this record, we endorse an extra accurate drowsiness detection approach which is a hybrid technique of eye retina detection and pulse sample detection.

1. INTRODUCTION
Driving force exhaustion is a vast variable in an expansive range of car accidents. Past due insights, investigate that every year many deaths and injuries may be credited to weariness associated injuries. Avenue accidents in the world possess much loss. It can be seen there are around 2,four hundred road accidents always that's one death per each four hours. It has been figured around 20% of vehicle crashes with driving force fatalities are due to driving force’s drowsiness. It became uncovered that using execution fast drop with multiplied tiredness which brings about making extra than 20% of all automobile accidents [1]. Less attention leads the driver to being distracted and the chance of road twist of fate is going high. Drowsiness related injuries have all the earmarks of being extra serious, due to the higher speeds concerning distraction and the driving force being no longer able to take any keeping off activity, or maybe brake, before the coincidence. The development of improvements for recognizing or stopping tiredness of the motive force is a tremendous take a look inside the field of coincidence stopping systems. Due to the danger that that drowsiness presents on the street, techniques need to be created for checking its effects. Loss of the attention due to the tiredness reasons a few modifications inside the human's frame and sports. Those aspect outcomes and parameters empower us to efficiently degree the drowsiness stage [2]. Exclusive strategies for drowsiness identity can be partitioned into standard classifications. The techniques inside the first collecting apprehend the extent of the tiredness focused across the physiological modifications in the body. Eye repute, speech houses, time interval between two yawning, head function, sitting carriage, coronary heart price, and mind alerts are absolutely a couple of illustrations of the techniques inside the first classification. Drowsiness moreover brings about a few changes within the driving style. Techniques within the second category estimate the motive force.Drowsiness level by following these progressions, storage attitude, distance from the subsequent car, lateral role of the car, longitudinal pace, longitudinal speeding up, and lane departure are applied as a part of the method of the second one class.
2. LITERATURE REVIEW

In this work, we look at the synchronisation of the dynamic behaviour, as a degree of complexity, of coronary heart rate (ECG) and brain (EEGs). EEG and ECG records have at some point been amassed in experiments in sleep-disadvantaged subjects exposed to real conditions. The diploma in which mind and heart complexity loses complexity in synchronous fashion shows that the two structures are likely to interact [3]. The preliminary consequences from the examination of four subjects reveal the life of a weak to intermediate correlation between these organic oscillator pairs.

Furthermore, both coronary heart price and mental alerts have been computed by evaluating energy spectrum and by investigating the association of synchronising styles with widespread frequencies within both systems [4].

The national motorway site visitor’s protection administration estimates that from 1989 via 1993, driving force drowsiness/fatigue became a contributing element in crashes yearly on U.S. highways. A current study has tested the consequences of innovative sleep deprivation on using overall performance to assess the fee of crashes and the modifications in riding overall performance attributable to sleepiness. Because it might be dangerous to take a look at this below real driving conditions, the high-constancy highway using a simulator was used. a spread of measures, along with non-stop electroencephalogram (EEG) tracking, videotaping, and analyses of using overall performance data and questionnaire facts have been used to determine the consequences of sleep deprivation at the using performance of six men and six women aged 26-35. Motorway protection variables, which include range of crashes and number of lane tours, were unacceptably excessive on day 3 after 36 hours of no sleep and on day 4 after 60 hours without sleep. More subtle measures of motorway safety, together with velocity and lateral placement variance, had been also related to sleep deprivation [5]. Even though some tendencies seemed, none of the variables have been drastically suffering from partial sleep deprivation, possibly because individuals have been younger, very wholesome, and not medicated and because they had no sleep debt at the beginning of their life. An initial neural internet analysis using the facts gathered is underway. If styles of using overall performance can be recognized, it'll lend robust support for the improvement of a neural internet in-vehicle-based totally device for detecting and caution drowsy drivers of ability risk.

The effects of partial sleep and the driving time on next alertness and performance have been investigated by vehicle drivers. 20 healthy male topics, 25 and 55 years old without any problems of sleep, participated in simulated riding periods between 14 p.m. and four p.m. Subjects had been deprived of sleep before one consultation, as they had been allowed to sleep handiest between 3 a.m. and 7 a.m. in the previous night. The subjects’ performance, Electroencephalogram, and Karolinska Sleepiness Scale (KSS) score have been recorded throughout the driving mission. The results found that sleep deprivation affects KSS but does not affect (alpha theta) spectral strength while driving time affects these parameters. The use of sleep restriction also encouraged this effect. Time on my own had a huge impact on riding performance; the sleep restriction had the simplest effect on one of the performance indices examined; the diversity of right-hand edge crossings. These results are interpreted in sentences of the relationship between alertness and overall deterioration of performance [6].

Template Matching is a method for searching and finding the region of a template photograph in a bigger picture. OpenCV comes with a function cv.matchTemplate() for this motive. It without a doubt slides the template photograph over the enter photograph (as in 2nd convolution) and compares the template and patch of enter picture below the template photo. Several evaluation methods are implemented in OpenCV. (You may take a look at medical doctors for extra information). It returns a gray scale photograph, in which each pixel denotes how a great deal the neighbourhood of that pixel is healthy with template does.
If the input image is long (WxH) and the template image is big (wxh), the output image can be big (W-w+1, H-h+1). You can use cv.minMaxLoc() to find the most/minimum cost as soon as the result is achieved. Take it as the left-top corner and take (w,h) as width and rectangle peak. This rectangle is your template region.

With the population boom, the occurrence of automotive injuries has also increased visibly. A thorough analysis shows that about one and a half million accidents occur in India by myself in the course of one year. Likewise, approximately 60% of these accidents are precipitated because of motive fatigue. Driver fatigue affects driving ability in three areas: a) Coordination is impaired, and b) response time is longer, and c) judgement is affected. This paper offers the use of image processing, face/eye detection strategy for an actual time monitoring system. Similarly, haar cascade samples are used to distinguish between a watch blink and a dull/fatigue detection in order to perform certain realtime calculations.

This mission is the extension of NATURAL FY 2008 and FY2009, which are called "Realtime Non-Intrusive Drowsiness Driver Detection" projects, which aim to expand an intrusive motive force drowsiness detection device in real time in an attempt to reduce drowsiness from injuries. In our previous research, non-intrusive sensors were developed for cardiac beat measurement on the vehicle steering wheel. Cardiovascular (HRV) variability is analysed from the heartbeat pulse alerts to detect drowsiness of the driving force. Promising results were obtained. Yet the use by the most manageable one parameter (low-frequency(LF)/HF ratio of HRV) in the entry right into the driving force's fame which has relative high variability and a sort of changing pattern for certain drivers is an important problem with the preceding machine. We advise to use in this project more than one drowsiness-detection parameter which includes the LF/HF ratio, the VLF (very low frequency) HRV signal, RRV (common moving coronary coronary heart rate c programme language duration), the change in pressure of the driver, and the variability in wheel movements. This integrated approach could be investigated in a driving simulator with an Electroencephalography (EEG) dimension and evaluation as EEG is the maximum correct indication of the levels of sleep and can be used as a preferred "gold" and to discover the occasions where the fall-in sleeves are off-line.

The paper provides an set of rules for detection of the attention-blanks in photograph sequences. The hired picture processing strategies encompass answers, such as Haar-like face detection and template matching based eye tracking, as well as newly evolved algorithms for skin color segmentation and modified active contour model with ellipse becoming for eye-blink detection. The developed set of rules became used for human fatigue tracking and as a middle of the eye-blink managed human-pc interface. [7]Motive force’s psychosomatic nation adaptive using guide safety device is surprisingly expected to lessen the wide variety of visitor’s injuries. Drowsiness is ideal as a vital hazard component which may additionally bring about severer visitors accidents. Coronary heart fee was obtained from Electrocardiogram (ECG). Then coronary heart charge variability (HRV) became calculated from ECG waveform the use of the maximum entropy approach. CCD digital camera with infrared ray changed into added to capture gaze route and eyelid closure. Have a look at a speculation that simultaneous size of both coronary heart fee variability (HRV) and blinking duration may be beneficial means to come across onset of drowsiness in actual time. The technique to estimate onset of drowsiness was proposed, which feature can be included into driver’s psychosomatic state adoptive use of a support protection system for the reduction of visitors injuries [8].

3. **EXISTING SYSTEM**

Fatigue is a protection problem that has not but been deeply tackled by using any united states in the global in particular due to its nature. Fatigue, in well known, may be very difficult to measure or examine unlike alcohol and capsules, which have clear key indicators and assessments that are to be had without problems. Likely, the exceptional answers to this problem are recognition of
approximately fatigue-associated injuries and selling drivers to confess fatigue while needed. The previous is tough and lots more expensive to reap, and the latter is not feasible without the previous as using for lengthy hours could be very rewarding.

Quantities of the latest 0.33 product categories are low in accuracy and excessive blunders in the drowsiness detection system using a camera. Furthermore, various methods, including breathing detection, upward temperature, coronary heart rate irregularities, etc., also have poor accuracy and a high cost for errors. In order to increase detection of drowsiness, the approach proposed in this paper improves the accuracy of visual detection and blindness and further improves the prevention of drowsiness through the use of a carbon dioxide sensor chip.

4. PROPOSED SYSTEM
The computer system proposed in this paper therefore increases the overall performance of the sleepiness prevention system by increasing the accuracy and reduced the error load of sleepiness detection by integrating numerous techniques of the current product used to discover and prevent sleepiness movement in figure 1. Moreover, songs and broadcasts are robotically turned on or the driver can choose music and broadcast via their voice to save you drowsiness. The information is discussed in the element below. This analyses current domestic and overseas cases of drowsiness detection in segment 2 and suggests a design to break down drowsy use by introducing a CO2 sensor chip and checking the flash price of the eyelids in phase 3. Section 4 offers a device constructed entirely on the basis of the phase 3 design. Section 5 proposes a final and future study.

5. MODULES:
1. Physiological sign for Sleepiness Detection
Sleep latency on the preservation of wakefulness take a look at became added to come across sleepiness of a subject with the aid of the usage of daylight hour’s polysomnography (PSG) in an anechoic room as well as measuring of coronary heart charge and eye-blinking as proven in Fig. three. The topics had been told to sit down on loosen up posture. Eyelids of the difficulty changed into advised to be open without responsibilities with darkish illumination of the room. The PSG is a method to estimate an onset of sleepiness with the aid of using the physiological alerts in the electroencephalogram (ECG) by means of the usage of the 10-twenty electrode gadgets, electrooculogram (EOG), and electromyogram (EMG). The analysis of PSG changed into manually achieved on a professional judgment basis.

2. Measurement of Autonomic activity on Drowsy nation
The RRI inside the electrocardiogram waveform used by NASA lead approach becomes acquired from ECG waveform; it is stated that the NASA lead approach is not primarily laid low with the EMG noise in figure 2 and 3. The RRI was recorded to calculate HRV by means of using the software program of Memcalc/Win (GMS Co. Tokyo, Japan). The Memcalc is one among calculation techniques to investigate electricity spectrum density of a time serial fact set primarily based on the most entropy technique. The method is stated as suitable for expressing the primary alternative of a sure time serial statistics set, that can acquire the excessive-frequency low and high (LF/HF). HRV is frequently used as an index to measure autonomic nerve activity. The electricity spectra were quantified at zero.04-0.15Hz (low frequency energy; LF) and 0.15-zero.40Hz (excessive frequency electricity; HF). The HF aspect and the ratio of LF/HF were used as indices of autonomic nerve activities.

3. Measurement of Eyelid movement
Via the usage of a tracking unit (smart Eye’s Anti Sleep) composed of an infrared CCD camera, face data of head position, gaze direction and eyelid distance changed into measured the unit needs one time calibration on the test board at the beginning of measurement.
An instance of a normal wave form of eyelid distance and eyeball function in mixture with vigilance state and sleep degree. The results is shown in figure 4-6. The subsequent algorithm was adopted for detection of blinking, which used a median filter out of a 70 mm 2nd time window with 60 Hz sampling charge.

**SOFTWARE:**
- Operating System: Windows 7/8/10
- Language: Python 3.7
- Tools: Pandas, Numpy, Scikit, Matplotlib, Flask and more
- Browser: Firefox / Chrome / Internet explorer

**HARDWARE:**
- Processor: Intel Core i3
- RAM: 4GB
- Hard Disk: 1TB
- Mouse: logical optical mouse
- Keyboard: logical 107 keys
- Motherboard: Intel
- Speed: 3.3GHZ

![Figure 1. Outline structure of proposed system](image-url)
6. RESULTS
7. CONCLUSION AND FUTURE SCOPE

It absolutely meets the goals and requirements of the device. The framework has accomplished an unfaaltering kingdom in which all the bugs have been disposed of. The framework cognizant customers who are acquainted with the framework and realize it is a focal point and the reality that it looks after

Figure 4. The test score of driver eye closing

Figure 5. Test score when eye is open

Figure 6. Test score increases above threshold and alarm ringing
the difficulty of stressing out for individuals having fatigue-associated problems to inform them about the drowsiness level whilst riding.

The version can be stepped forward incrementally through using other parameters like blink price, yawning, kingdom of the car, and so forth. If most of these parameters are used it could enhance the accuracy by means of lots. We plan to further work at the undertaking through adding a sensor to song the heart rate so as to prevent injuries precipitated due to unexpected coronary heart attacks to drivers. Same version and strategies may be used for numerous different uses like Netflix and other streaming services can discover while the person is asleep and forestall the video therefore. It can also be used in applications that forestall a person from sound asleep.

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