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DRIVER DROWSINESS DETECTION USING IMAGE PROCESSING

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Abstract:

A Person when he or she does not have a proper rest especially a driver, tends to fall asleep causing a traffic accident. It is why the present work wants to realize a system that can detect the drowsiness of the driver, in order to reduce traffic accidents. For that system, it will take the processing of images through a camera which will focus on the driver. In that, it is going to analyze the changes that happen in the face and then will be processed through a program in order to detect drowsiness to send an alert to the driver.

Keywords: Image Acquisition, Viola-Jones Algorithm, Hough Transform, Vision Cascade Object Detector.

1. Introduction:

The development of technologies for detecting or preventing drowsiness while driving is a major challenge in the field of accidentavoidance system. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects.

The aim of this project is to develop a simulation of drowsiness detection system. The focus will be placed on designing a system that will accurately monitor the open or closed state of the driver's eyes and mouth. By monitoring the eyes, it is believed that the symptoms of driver's drowsiness can be detected in sufficiently early stage, to avoid a car accident. Yawning detection is a method to assess the driver's fatigue. When a person is fatigue, they keep yawning to ensure that there is enough oxygen for the brain consumption before going to drowsiness state. Detection of fatigue and drowsiness involves a sequence of images of a face, and the observation of eyes and mouth open or closed duration. Another method to detect eye closure is perclos. This detection method is based on the time of eyes closed which refers to percentage of a specific time.

The analysis of face images is a popular research area with applications such as face recognition, and human identification and tracking for security systems. This project is focused on the localization of the eyes and mouth, which involves looking at the entire image of the face, and determining the position of the eyes and mouth, by applying the existing methods in image processing algorithm. Once the position of the eyes is located, the system is designed to determine whether the eyes and mouth are opened or closed, and detect fatigue and drowsiness

.2. Literature survey

There are many previous researches regarding driver drowsiness detection system that can be used as a reference to develop a real-time system on detecting drowsiness for drivers. There is also several method which use different approaches to detect the drowsiness signs. According to MIROS (Malaysia Institute of Road Safety), from the year of 2007 until 2010, they were 439 cases of road accidents have been investigated by the MIROS crash team.

There is no appropriate sleep environment: The driver has to make a change with another driver for rest. But the sleep environment does not have the necessary implements, nor the conditions of space and calm to sleep. In it describes a study at the bus station Fiori and Huancayo. The first has 81% of drivers sleep in the trunk of the car and in the second is 62%. In addition, in the first final bus station, 50% of the drivers sleep when the car is in motion and 42% of the final second bus station.

3. Existing Method

IOT based driver drowsiness detection

Disadvantages of using IOT based driver drowsiness detection system

- It requires high computing requirements.

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- Other than IOT, still we have some existing methods which require sensors to detect the intensity of drowsiness of driver.

4. Proposed Method

In the proposed system webcam is used to detect the movements of driver's face and eye.
Here, by capturing the image of driver, image is processed through the image acquisition, image processing techniques to find the eye movements and facial movements of the driver. Viola-Jones Face Detection Algorithm is used to detect the face of the driver in image processing.
Advantages:

- Security of a vehicle
- Detect driver drowsiness

5. METHODOLOGY

The development of the research is following the next objectives below:

A. Causes of driver drowsiness

- Sleep less than 8 hours
- There is no appropriate sleep environment
- No work schedule

B. Patterns of Drowsiness

- Frequent flicker
- Moving the head from side to side

5.1 SYSTEM DESIGN

The System Design Document describes the block diagram, tools involved , input algorithm,detailed design, and block diagram description.

5.2 Block diagram

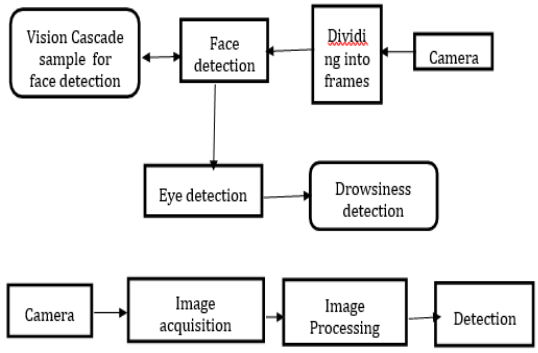

Image Acquisition:
Image Acquisition is the first step in any image processing system. The general aim of any image acquisition is to transform an optical image (real-world data) into an array of numerical data which could be later manipulated on a computer. Image acquisition is achieved by suitable cameras. We use different cameras for different applications.
Image Processing:
In this stage, the image becomes a two-dimensional matrix when it is processed in MATLAB. Each element of the matrix corresponds to a pixel of the image. The fundamental thing is the preparation of the image so that the detection is effective. The process begins with the modification of the characteristics of the image to achieve an improvement in the image. The characteristics are: the contrast and the noise that exists in the image. On the other hand, several filters are applied to the image before detection.
Viola-Jones Face Detection Algorithm
Viola-Jones object detection framework can be used to detect a variety of object classes, but it is more focused on the detection of face and facial features. This algorithm uses the concept of rectangle features which involves the sums of pixels within the rectangular areas. From Figure 8, the sums of the pixels that lie within the white rectangles are subtracted from the sum of pixels in the grey rectangles.
Hough Transform
The Hough transform is a feature extraction technique used in image analysis, computer vision, and digital image processing. The purpose of the technique is to find imperfect instances of objects within a certain class of shapes by a voting procedure. This voting procedure is carried out in a parameter space, from which object candidates are obtained as local maxima in a so-called accumulator space . Detection
At this stage we will proceed with the identification of drowsiness patterns. To process the patterns will begin with the isolation of the section of interest as the eyes. Then, the process of extracting characteristics begins, which analyzes the moment of closing the eyes and the distance from the opening of the eyes.

5.3 Flow Chart

Face Detection :
It takes one of the frame at a time 't' from frame grabber which later tries to detect the face of Automobile driver in every frame.
Eye Detection:
After detecting the face of Automobile driver with the face detection function, the eyes detection can be

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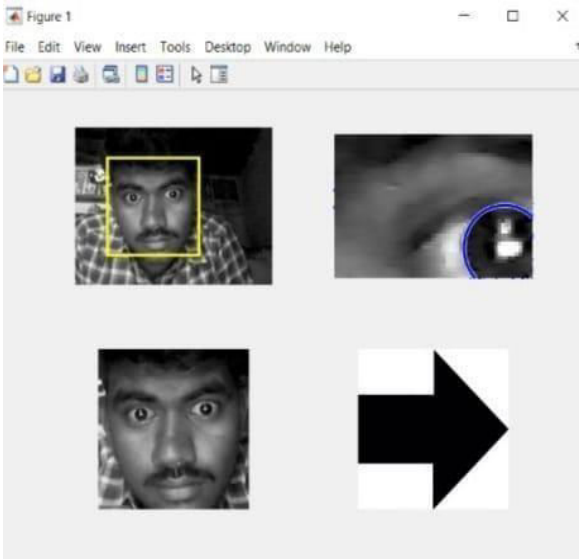
done with the help of eyes detection function. This can be done with Voila Jones Algorithm.

Detection:
Once the eyes of Automobile driver are detected, the drowsiness detection function detects whether the driver is drowsy or not, by taking into consideration whether the eyes are open or closed that is the state of the eyes.

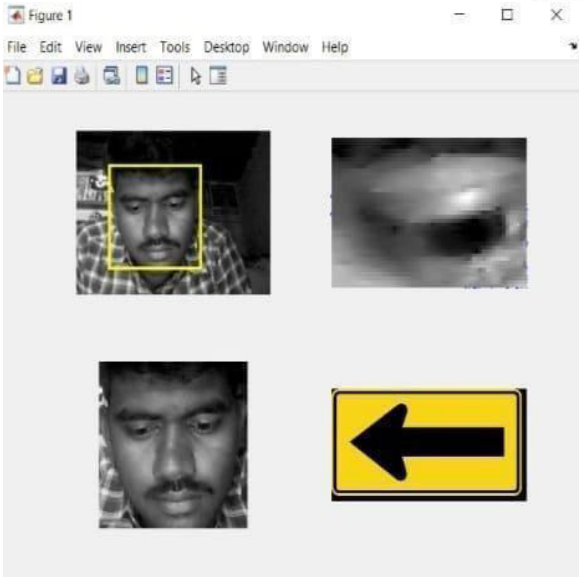
6. Results

6.1 Eyeball Movement

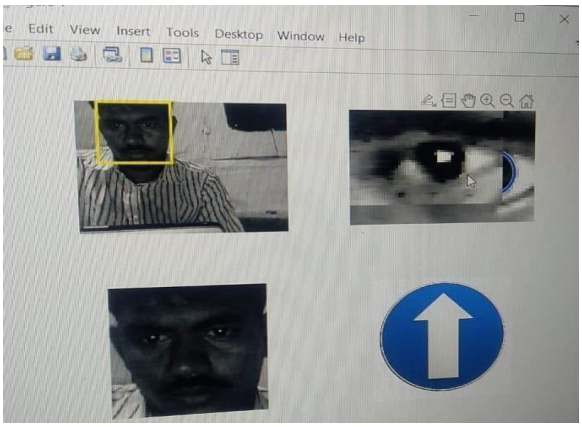
- When the eyes move towards left side i.e., when the eyeball movement is towards left, it shows right



- When the eyes move towards the right side i.e., when the eyeball movement is towards right. It shows left.



- When the eyeballs straight, i.e., when the eyes do not move to any side i.e., when the eye ball sees straight, it shows straight



6.2 Eyeballs Not Visible

- When there is an obstacle in between the eye and webcam or if there is a random movement, then it shows no image

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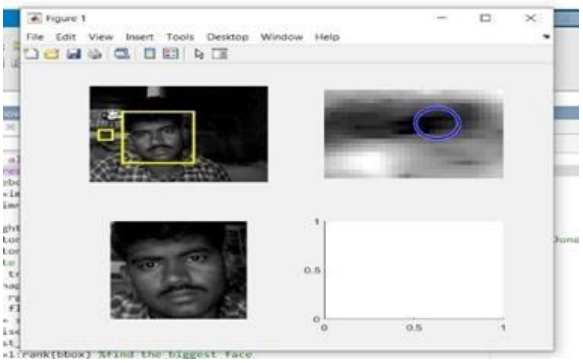

7. CONCLUSION

In this way, we have successfully implemented drowsiness detection using MATLAB and Viola Jones Algorithm. The developed system has been successfully tested. In conclusion, drivers have a bad habit to sleeping anywhere, which provides a bad break and as a consequence they have drowsiness. Drowsiness patterns are a fundamental part of the detection process, as this alerts the driver to reduce traffic accidents. Each stage depends on the other, it is important to know what stages, our system will have. Knowing the stages, we can know the hierarchy of the installation or operation.

8. FUTURE WORK

In the future, we would like to improve this idea and use the model more wisely. It is required to make the speed of the vehicle slow or slow down the speed of vehicle in real time drowsiness detection. In order to create continuous monitoring, threshold drowsiness detection should be kept aside. While monitoring the drowsiness continuously, when the level exceeds certain value a signal is generated which directly controls the braking of vehicle.

IX.REFERENCES

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