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# Real Time Drowsiness Detection of Eye's Recognition and Monitoring Using Deep Learning

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**ABSTARCT:** A new approach towards automobile safety and security with autonomous region primarily based automatic automotive system is projected during this conception. We have a tendency to propose 3 distinct however closely connected ideas viz. a Drowsy Driver Detection system and a traffic detection system with external vehicle intrusion dodging primarily based conception. In recent time's automobile fatigue connected crashes have very enlarged. so as to attenuate these problems, we've incorporated driver alert system by watching each the driver's eyes still as sensing still because the driver state of affairs based primarily based native setting recognition based AI system is projected. Driver drowsiness detection is a car safety technology which prevents accidents when the driver is getting drowsy. Driver fatigue often becomes a direct cause of many traffic accidents. Therefore, there is a need to develop the systems that will detect and notify a driver of her/him bad psychophysical condition, which could significantly reduce the number of fatigue-related car accidents. The development of these systems will cause many difficulties like fast and proper recognition of a driver's fatigue symptoms. One of the technical possibilities to implement driver drowsiness detection systems is to use the vision-based approach. Here we are detecting the driver drowsiness by estimating vision system of him.

**KEYWORDS:** Drowsy Driver Detection system, Driver fatigue, fatigue-related car accidents

## I. INTRODUCTION

Deep learning (also called deep structured learning or hierarchical learning) is a kind of machine learning, which is mostly used with certain kinds of neural networks. As with other kinds of machine-learning, learning sessions can be unsupervised, semi-supervised, or supervised. In many cases, structures are organised so that there is at least one intermediate layer (or hidden layer), between the input layer and the output layer. Certain tasks, such as as recognizing and understanding speech, images or handwriting, is easy to do for humans. However, for a computer, these tasks are very difficult to do. In a multi-layer neural network (having more than two layers), the information processed will become more abstract with each added layer. Deep learning models are inspired by information processing and communication patterns in biological nervous systems; they are different from the structural and functional properties of biological brains (especially the human brain) in many ways, which make them incompatible with neuroscience evidences.

Now a days the major accident is based on the driver's drowsiness, to rectify this in future and in the automated cars we are going to monitor the driver. By this we are going to detect the eyes of the driver and to monitor driver using this system. This system uses Kinect sensor, will detect the images in 3D so that we can obtain the exact results for the system. Additionally in this system we are going to detect the head movement of the driver so that we can detect the exact movement of the driver. Here the exact driver is identified by the human's skeleton identification method. The human is identified by the joints of the human. So that we can easily identify the moving parts in the body. By this we are going to detect the human skeleton.



## II. LITERATURE SURVEY

In the year 2017, driver drowsiness detection system, Anthirugopal, Vineeth, This algorithm using EEG signal based developing system reaction is high but EEG signal based reference is less accuracy and efficiency.

In the year 2010, Automated Video-based Measurement of Eye Closure for Detecting Behavioral Microsleep A. Malla, P. Davidson, P. Bones, R. Green and R. Jones. A device capable of continuously monitoring an individual's levels of alertness in real-time is highly desirable for preventing drowsiness and microsleep related accidents. This paper presents a development of non-intrusive and light-insensitive video-based system that uses computer-vision methods to measure facial metric for identifying visible facial signs of drowsiness and behavioral microsleep. The developed system uses a remotely placed camera with a near-infrared illumination to acquire the video. The computer-vision methods are then applied to sequentially localize face, eyes, and eyelids positions to measure ratio of eye closure. The system was evaluated in frontal images of nine subjects with varying facial structures and exhibiting several ratio of eye closure and eye gaze under fully dark and ambient lighting conditions. The preliminary results showed promising results with sufficient accuracy to distinguish between fully closed, half closed, and fully open eyes.

In the year 2010, Bright Pupil Detection in an Embedded, Real-time Drowsiness Monitoring System, : S. Vitabile, A. Paola and F. Sorbello, Driver's drowsiness is stated as an important cause of road and highway accidents. Therefore, the development of a system for monitoring the driver's level of fatigue is desirable in order to prevent accidents. The paper presents the design and the implementation of a system able to find and evidence the drowsiness level of a driver in an ordinary motor vehicle, in order to prevent car accidents. The system, made up of a car installed infrared video camera connected to the Celoxica RC203E FPGA based board, is able to perform a real time video stream processing. The system exploits the "bright pupil" phenomenon produced by the retina, that reflects the 90% of the incident light when a radiation of 850 nm wavelength hit the retina itself. While acquiring the video, a processing chain is executed to detect driver's eyes and to compute a PERCLOS (Percentage of Eye Closure) function linked to the drowsiness level of a driver. The achieved experimental results show that an entire 720\*576 frame processing requires only 16.7 ms, so that the system is able to perform real-time PAL video stream processing and has the potentiality to process 60 frames/sec. The effectiveness of the proposed drowsiness detection system has been successfully tested with a human subject in real operating condition, tracking driver's eyes and detecting drowsiness failures.

## III. PROPOSED SYSTEM

In existing system, they have are used SVM (support vector machine) to classify the components in the input video. While cropping the region of interest components in the video is not accurate. Sometimes it will show regions wrong. To sense the eyes first we have to create boundary boxes for that and a classification algorithm. The algorithm of SVM will not support. There are several different algorithms and methods for eye tracking, and monitoring.

Most of them in some way relate to features of the eye (typically reflections from the eye) within a video image of the driver. The original aim of this project was to use the retinal reflection as a means to finding the eyes on the face, and then using the absence of this reflection as a way of detecting when the eyes are closed.

Applying this algorithm on consecutive video frames may aid in the calculation of eye closure period. Eye closure period for drowsy drivers are longer than normal blinking. It is also very little longer time could result in severe crash. So we will warn the driver as soon as closed eye is detected.

In the video frame conversion, The input video has been captured by using either ipcam or webcam , From this the face is detected. The video is then converted into frames and the algorithms is worked on the frames

In the haar cascade, **Haar-like features** are digital image features used in object recognition. They owe their name to their intuitive similarity with Haar wavelets and were used in the first real-time face detector. A window of the target size is moved over the input image, and for each subsection of the image the Haar-like feature is calculated. This difference is then compared to a learned threshold that separates non-objects from objects. Because such a Haar-like feature is only a weak learner or classifier (its detection quality is slightly better than random guessing) a large number of Haar-like features are necessary to describe an object with sufficient accuracy.

In the face detection, The input layer is processed in the haar cascade algorithm for detecting the faces available in the given image. After detecting the face of an image the exact face is bounded by the box for showing detected image.

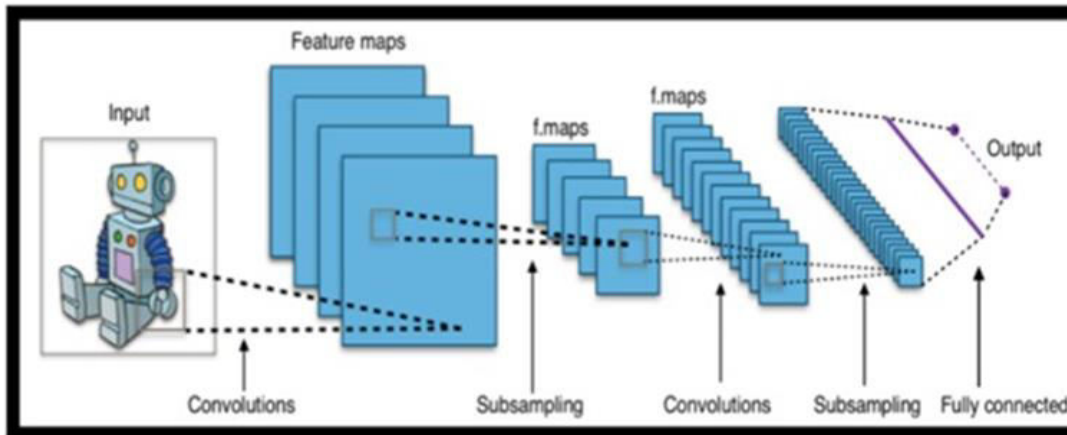


FIGURE NO 1 ARCHITECTURE DIAGRAM

The algorithm used is CNN. The Input Layer holds the raw input of image with width 32, height 32 and depth 3. The Convolution Layer computes the output volume by computing dot product between all filters and image patch. Suppose we use total 12 filters for this layer we'll get output volume of dimension 32 x 32 x 12. The Activation Function Layer will apply element wise activation function to the output of convolution layer. The Pool Layer layer is periodically inserted in the convets and its main function is to reduce the size of volume which makes the computation fast reduces memory and also prevents from overfitting.

Two common types of pooling layers are max pooling and average pooling. If we use a max pool with 2x2 filters and stride 2, the resultant volume will be of dimension 16x16x12. The Fully-Connected Layer layer is regular neural network layer which takes input from the previous layer and computes the class scores and outputs the 1-D array of size equal to the number of classes.

#### IV. EXPERIMENTAL RESULTS

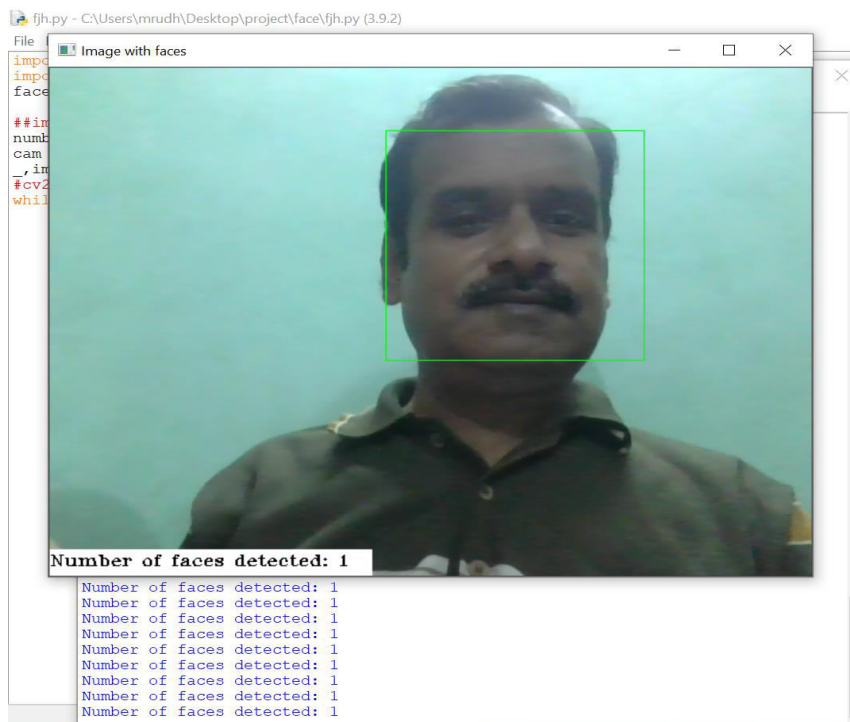


FIGURE NO 2 FACE DETECTION

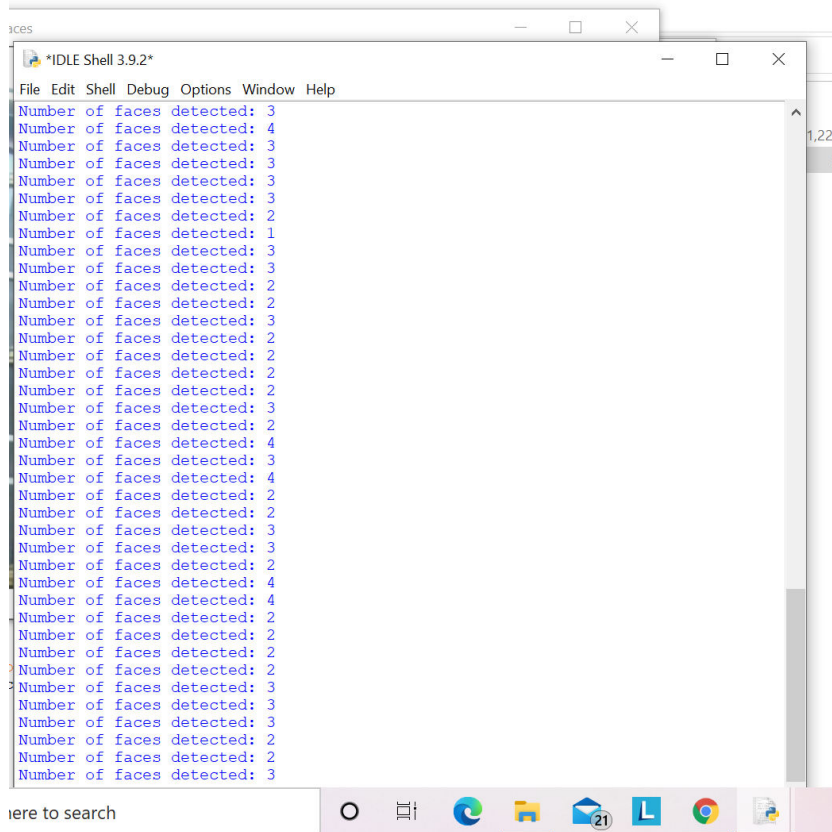


FIGURE NO 3 NUMBER OF FACE DETECTED

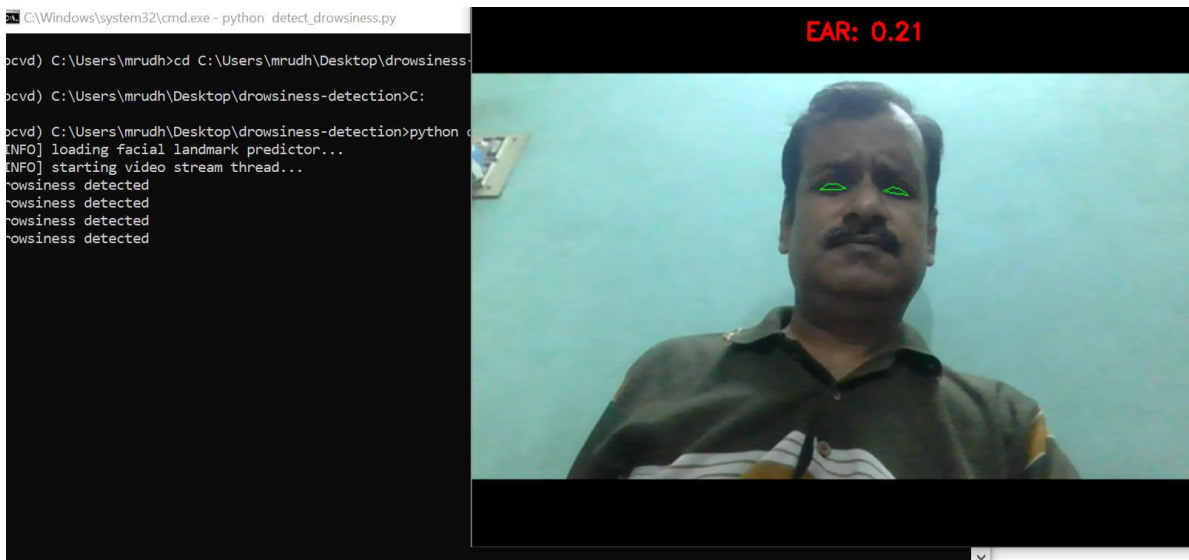
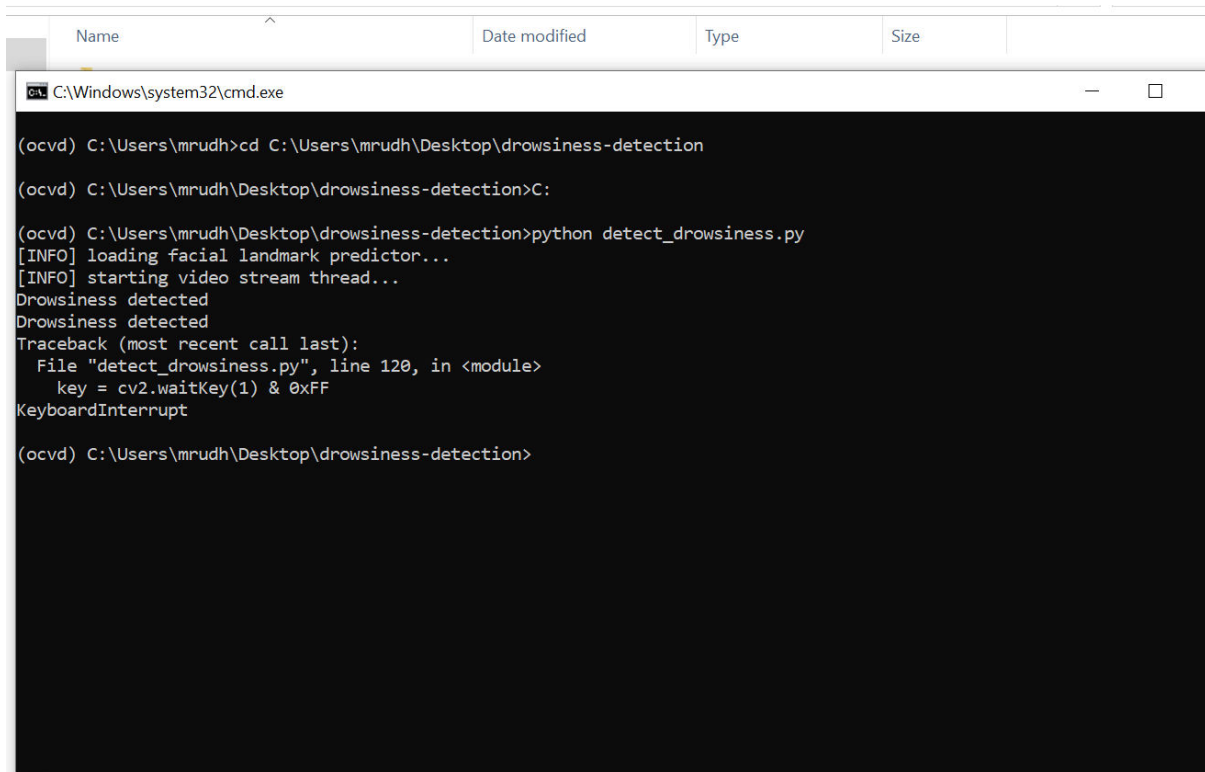


FIGURE NO 4 DROWSINESS DETECTION



```

C:\Windows\system32\cmd.exe
(ocvd) C:\Users\mrudh>cd C:\Users\mrudh\Desktop\drowsiness-detection
(ocvd) C:\Users\mrudh\Desktop\drowsiness-detection>C:
(ocvd) C:\Users\mrudh\Desktop\drowsiness-detection>python detect_drowsiness.py
[INFO] loading facial landmark predictor...
[INFO] starting video stream thread...
Drowsiness detected
Drowsiness detected
Traceback (most recent call last):
  File "detect_drowsiness.py", line 120, in <module>
    key = cv2.waitKey(1) & 0xFF
KeyboardInterrupt
(ocvd) C:\Users\mrudh\Desktop\drowsiness-detection>
    
```

**FIGURE NO 5 DROWSINESS DETECTED**

From the face, the eyes are detected for further processing to detect whether the driver is in drowsiness or not. In this, we are specially characterizing the eyes from the face. A real time algorithm to detect eye blinks in a video sequence from a camera is used in this proposed system. Recent landmarks detectors exhibit excellent robustness against a head orientation with respect to a camera, varying illumination and facial expressions. In this project, the landmarks are detected precisely enough to estimate the level of the eye opening.

The proposed algorithm the before estimates the land mark positions, extracts a quantity which is known as the eye aspect ratio (EAR) for characterizing the eye opening in each frame. In this technique, we are using different landmarks to detect the opening and closing of eye. This landmark detectors that capture most of the characteristic points on a human face image. The eye blink is a fast closing and reopening of a human eye. Each individual person has a little bit different pattern of blinks. The pattern differs in the speed of closing and opening of the eye, a degree of squeezing the eye and in a blink duration. The eye blink lasts approximately 100400ms. From the landmarks detected in the image, we derive the eye aspect ratio (EAR) that is used as an estimate of the eye opening state. For every video frame, the eye landmarks are detected. The eye aspect ratio between height and width of the eye is computed.

**V.CONCLUSION**

The development of environment perception and modeling technology is one of the key aspects for intelligent vehicles. First, the pros and cons of vehicular sensors are presented. Next, popular modeling methods and algorithms of lane and road detection, traffic sign recognition, vehicle tracking, Drowsiness detection and behavior analysis, and scene understanding are reviewed. Public datasets and codes of environment perception and modeling technology are also described. Current challenges for environment perception and modeling technology are due to the complex outdoor environments and the need of efficient methods for their perception in realtime.

**VI. FUTURE ENHANCEMENT**

The changeable lighting and weather conditions, and the complex backgrounds, especially the presence of occluding objects still represent significant challenges to intelligent vehicles. Furthermore, it is very important to recognize road



in the off-road environment. Since environment perception and modeling technology stage is the link with the work of localization and map building, path planning and decision- making, and motion control, the next step is to develop the entire system.

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