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Anti-Sleep Alarm for Drivers

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ABSTRACT: Video retrieval is an important technology used in the design of video search and extraction of a preliminary set of related videos from the database. The necessity of, efficiently querying for generally available video data has been improved with the increase in the availability of huge quantities of such data. Hence, content-based video data retrieval proves to be a challenging and crucial problem.

In this project, an effective video segmentation and retrieval system based on dominant features such as motion, color and edge is proposed. The video retrieval system can be split into three parts. First, video segmentation in which video is converted into frames. I and P frames are separated from all frames and later dividing the video into shots or scenes. Finally select the one or more key frames for each such shot. Second, features are extracted from the shots. In the Feature Extraction, motion features are extracted using Squared Euclidean distance from P shots, Color Feature is extracted based on color quantization and Edge Density feature is extracted for the objects present in the database video clips from shots. The third stage of the system retrieves given number of video clips from the database based on the query clip. The retrieval is performed based on the Latent Semantic Indexing(LSI), which measures the similarity between the database video clips and the query clip

KEYWORDS: Detection, Eye-Detection, CNN, Video camera, Driver.

I. INTRODUCTION

Driver exhaustion can be a significant variable in an expensive number of vehicle accidents. road accidents in india cause financial losses around rs.9.34 billion every year. it can be seen there are around 2,700 road accidents consistently which is one death per every four hours. It has been figured around 25% of car crashes with driver fatalities are due to driver's drowsiness. It was uncovered that driving execution quickly drop with expanded tiredness which result in making more than 20% of all vehicle accidents. Less attention and focus while driving, heads the driver to being distracted and the likelihood of street accident goes high. Drowsiness related accidents have all the earmarks of being more serious as the driver isn't capable of taking any preventive measures at that moment. Because of the danger that the drowsiness presents on the road, strategies need to be created for checking in its influences.

The most common type accident in today's world is the accident occurring due to the sleepiness of the driver irrespective of day and night. The death rate of accidents due to this has spiked to 21% over the world. This shows how serious this problem is. The Drowsiness Detection is a safe technology that can prevent accidents that are caused by drivers who fall asleep while driving. The objective of this python project is to build a Drowsiness Detection Model which will detect that a driver's eyes are closed for a few seconds.

Relevance:

OpenCV is an open-source computer vision library that provides a wide range of functions for image and video processing. It can be used to capture video frames from a camera or a video file, and then analyze the frames to detect signs of drowsiness in the driver. Some common signs of drowsiness that can be detected using computer vision techniques include eye closure, head movement, and yawning.

Python is a popular programming language for developing computer vision applications, and it has many libraries and frameworks that can be used for drowsiness detection. For example, the dlib library provides facial landmark detection, which can be used to detect eye closure and head movement, while the face_recognition library can be used to recognize facial features and detect yawning.

Overall, Python and OpenCV provide a powerful platform for developing drowsiness detection systems. By combining image and video processing techniques with machine learning algorithms, it is possible to build a robust and accurate system that can detect signs of drowsiness in real-time and alert the driver to take action to avoid accidents

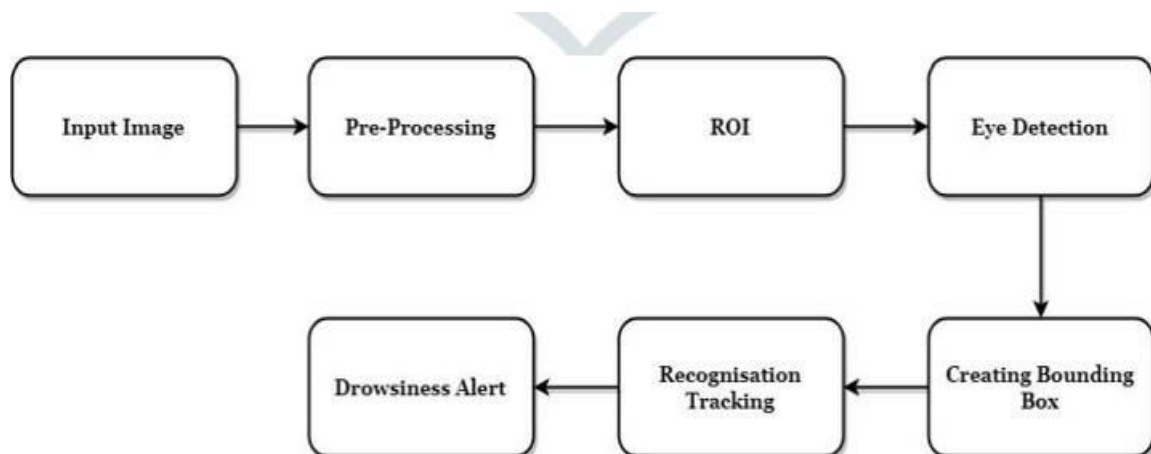
II. KEY HIGHLIGHTS

1. Eye Detection: Once the face is detected, the next step is to detect the eyes. This can be done using the Haar cascades for eye detection provided by OpenCV.
2. Eye Tracking: After the eyes are detected, the next step is to track them using the optical flow algorithm. This helps to track the movement of the eyes and detect if they are closing.
3. Raspberry Pi4: Raspberry Pi boards are small and compact, making them easy to install and maintain. They are also very energy-efficient, which means that they consume very little power and generate very little heat, reducing the risk of hardware failures and prolonging the lifespan of the device.

III. HARDWARE And SOFTWARE COMPONENTS

- Digital Camera
- Raspberry Pi
- Buzzer
- Monitor Display
- HDMI wires
- Python programming language used
- Python IDL
- Pre-Determined setup in dlib
- Email alerts

IV. PROPOSED SYSTEM



Block Diagram

Input Image: This block contains the sample images of the driver who is interacting with our system. The images will act as input for our system and they will be helpful to detect the facial expression and also the eye pattern of the driver in question. The images taken are pretty important as they play a major part in output generation. These images are then subjected to image processing, Eigen algorithm etc. for detecting that the driver is drowsy or not.

Pre-processing: In this block the main focus is on image. In some cases, the image may be distorted or captured incorrectly or it may happen that the image needs to be enhanced as per the need. The process of correcting the missing components in the image or making the required enhancements takes place in this block. It includes operations such as (e.g., rotation, scaling, and translation).

ROI (Region of Interest): Once the face is found its ROI is detected and processed. In the second block, the detection of driver drowsiness via eyelid closure takes place. The eye of the driver is continuously monitored and if found closed for a certain period of time the alarm sound.

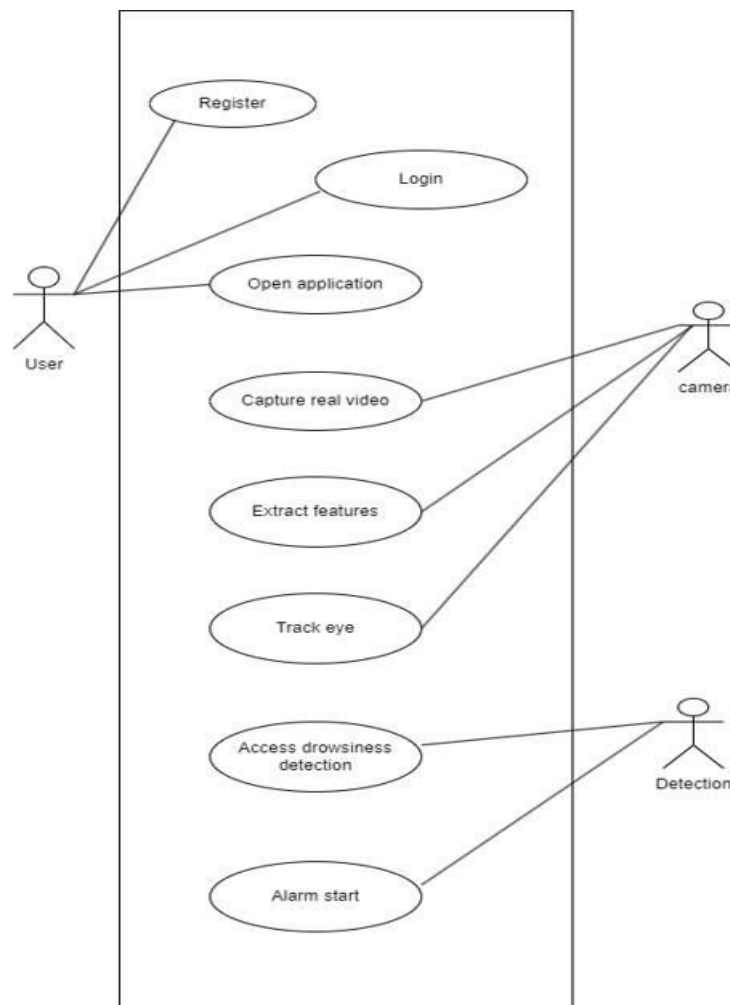
Eye Detection: The total count of frames in which eyes are closed are identified. When this number of frames is above a certain threshold, the diver will get a visual warning on the navigation display that points out he is drowsy. Then the alarm will be generated.

Creating Bounding Box: As we all know a bounding box is an imaginary rectangle that serves as a point of reference for object detection and creates a collision box for that object. Data annotators places these rectangles over images, outlining the object of interest within each image by defining its X and Y coordinates as implemented in our system the imaginary box is created for eye detection and also the collision box is formed with its reference.

Recognition Tracking: The main face detection, recognition, and tracking features and functions consists of: Detecting faces Decoding of an image file and detecting faces on it can be done here. Recognizing faces By using example faces you can recognize faces in an image. Tracking faces Tracking of faces using the camera preview images, starting from a specific location in the image can be carried out here.

Drowsiness Alert: This block comes into play or has a role to play specifically when the particular driver is detected as drowsy. If the driver is drowsy the process of generating an alert alarm is carried out here.

V. FLOWCHART



VI. METHODOLOGY

There are different methodologies that can be used for drowsiness detection system using Python and OpenCV. Here are some general steps that can be followed:

CNN: A convolutional neural network (CNN or ConvNet) is a network architecture for deep learning that learns directly from data. CNNs are particularly useful for finding patterns in images to recognize objects, classes, and categories.

Eye Detection: Once the face is detected, the next step is to detect the eyes. This can be done using the Haar cascades for eye detection provided by CNN.

Eye Tracking: After the eyes are detected, the next step is to track them using the optical flow algorithm. This helps to track the movement of the eyes and detect if they are closing.

Eye Aspect Ratio (EAR): The eye aspect ratio is a measure of the openness of the eyes. It can be calculated by measuring the ratio of the length of the eye's vertical axis to the length of the eye's horizontal axis. The EAR value decreases when the eyes are closing. By monitoring the EAR value over time, it is possible to detect when the eyes are closing or when the person is becoming drowsy.

Alert System: Finally, an alert system can be implemented to warn the driver if they become drowsy. This can be done by playing an alarm or by flashing a warning message on the screen.

Results



VII. CONCLUSION

In this way we have implemented the drowsiness detection system using python successfully. The alarm will automatically goes on when the driver's eyes are closed more than the given time interval. He system must be mounted on the vehicle in the real world for the proper execution of driver drowsiness system. This system will help in lowering the accidents which are mostly done due to driver falling asleep while driving. The system will detect drowsiness by observing eye blinking patterns that is achieved by using Euclidean distance ratio i.e. eye blinking ratio. It is most efficient technique and the whole program is much faster than by using CNN.

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