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A DRIVER FACE MONITORING SYSTEM FOR FATIGUE AND DETCTION

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Abstract

Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to effectively perform a specific task without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. Machine learning algorithms build a mathematical model of sample data, known as “training data”, in order to make predictions or decision without being explicitly programmed to perform the task. Machine learning algorithms are used in a wide variety of applications, such as email filtering, and computer vision, where it is infeasible to develop an algorithm of specific instructions for performing the task. Drowsiness detection is a computer technology related to computer vision and image processing that deals with detecting instances of person’s face.it is a technology which helps to prevent accidents caused by the driver getting drowsy. A computer vision system that can automatically detect driver drowsiness in a real-time video stream and then play an alarm if the driver appears to be drowsy is a great pros for the drivers around and help then have a safety ride.

1. Introduction

Automotive population is increasing exponentially in the country. The biggest problem regarding the increased traffic is the raise in number of road accidents. Road accidents are undoubtedly a global menace in our country. The global status report on road safety published by the World health Organization (WHO) identified the major causes

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of road accidents are due to driver errors and carelessness. Driver sleepiness, alcoholism and carelessness are the key players in accidents and very serious problems. Monitoring the driver action while driving by examining the man of vehicle can be a very prominent task in order to enhance safety while driving. To differentiate between unintentional and intentional car steering wheel inputs, will be the main key element to be discovered , such as a sudden large steering input could indicate the driver ‘s level of alertness.

2. Literature Survey

Motoki Shino [1] proposed a Drowsy driving is one of the main causes of traffic accidents. To reduce such accidents, early detection of drowsy driving is needed. In previous studies, it was shown that driver drowsiness affected driving performance, behavioural indices, and physiological indices. The purpose of this study is to investigate the feasibility of classification of the alert states of drivers, particularly the slightly drowsy state, based on hybrid sensing of vehicle-based, behavioural, and physiological indicators with consideration for the implementation of these identifications into a detection system.

Shan Jiang [2] proposed a The development of drowsiness detection technologies is both an industrial and academic challenge. In the automotive industry, Volvo developed the Driver Alert Control which warns drivers suspected of drowsy driving by using a vehicle-mounted camera connected to its lane departure warning system (LDWS).

3. System Design

The identification of classes in their relationship as well as their collaboration in the object, classes are divided into entity classes and control classes. The computer

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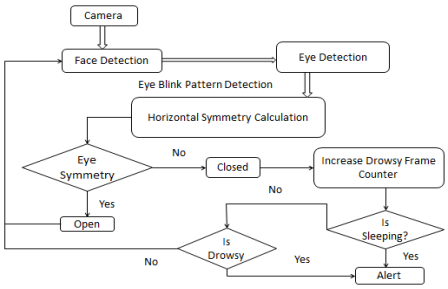
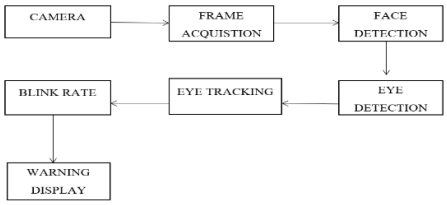
Aided Software Engineering (CASE) tools that are available commercially do not provide any assistance in this transition.

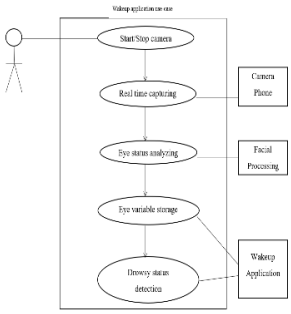


Data Flow Diagram (DFD) is a two – dimensional diagram that describes how data is processed and transmitted in asystem. The graphical depiction recognizes each source of data and how it interacts with other data sources to reach a mutual output. In order to draft a data flow diagram, one must

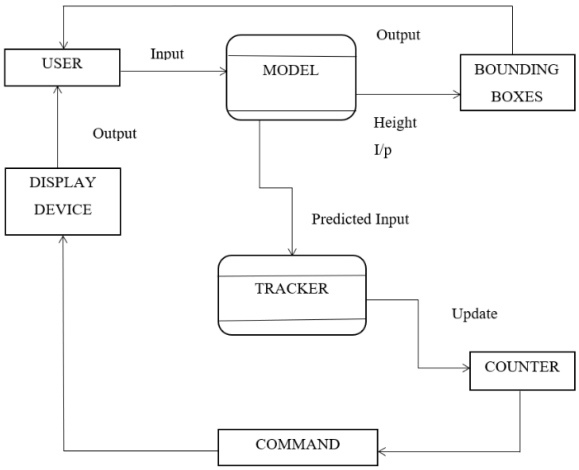
- Identify external inputs and outputs
- Determine how the inputs and outputs relate to each other
- Explain with graphics how these connections relate and what they result in.



The two main component a user or another system that will interact with a system.



- It is documentation support which is understood by both programmers and nonprogrammers. As DFD postulates only what processes are accomplished.
- A physical DFD postulates where the data flows and who processes the data.
- It permits analyst to isolate areas of interest in the organization and study them by examining the data that enter the process.



4. Implementation

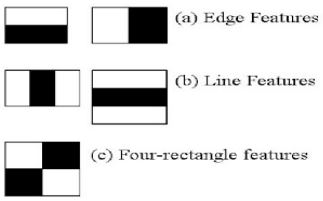
System implementation(or project execution) is the phase where various and plans become reality. This is the logical conclusion, after evaluating, deciding, visioning, planning, applying for funds and finding the required resources of a project. It is important to consider that independently of the nature of the project, implementation takes time, usually more than it is planes. The different phases of the algorithm are driven by:

- Face Detection
- Eye Detection
- Mouth Detection

Haar Cascade Classifier

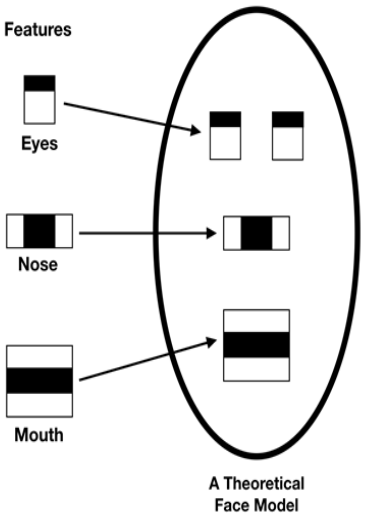
The algorithm can be explained in four stages:

- Calculating Haar Features
- Creating Integral Images
- Using Adaboost



Face Detection

The face is detected using Viola Jones based Haar Classifiers. The classifier is trained for a set of positive and negative images .



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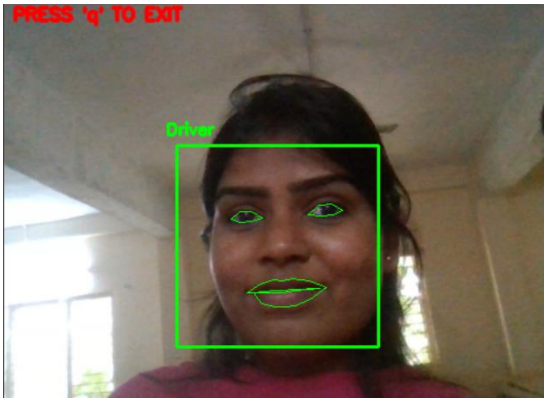
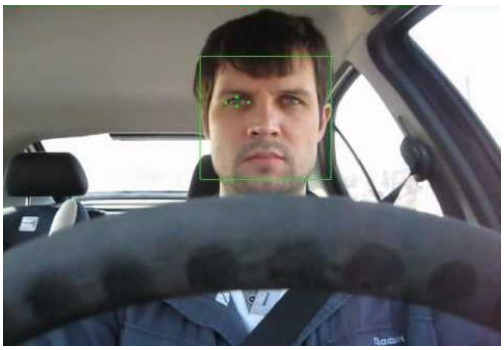
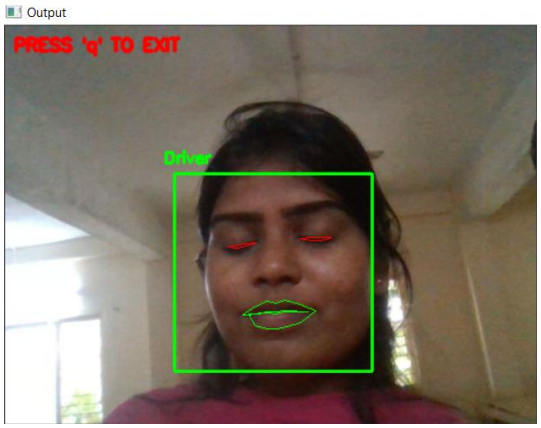


Eye Detection

To detect and localize facial landmark we'll need the dlib library which is imported dlib's 68 facial landmark are indexable which enables us to extract the various facial structures using simple Python array slices.

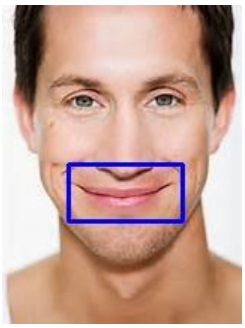


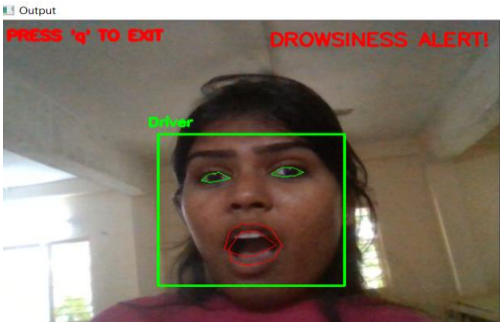
An eye tracker is a device for measuring eye positions and eye movements. Eye trackers are used in research on the visual system, in psychology, in marketing, as an input device for human computer interaction, and in product design.



Mouth Detection

Mouth detection is the main branch of the face detection, and plays an important role in lip-reading recognition, identity authentication, and mouth- shape recognition etc.





Conclusion and Future Enhancement

In our paper, We have devised a novel drowsiness detection system for drivers using OpenCV and Dlib computer vision library. The system so developed is efficiently able to detect drowsiness based on eye related parameters by monitoring the blink rate.

The future works may focus on blinking rate per minute and difference between yawning and speaking.

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