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DROWSINESS DETECTION SYSTEM USING ML & IP

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Abstract - *This paper is about machine learning and Computer vision-based drowsiness detection of driver Based on the level of fatigue experienced by the driver that is the sleepiness experienced by the driver during the motion of the car. This involves the tracking of a Human face in presence of the different background as well as different colors. This is the prerequisite Conditions which are necessary for the image processing as well as the face detection. This paper also includes fuzzy logic which combines with image processing for face detection. After this, the eyes Detection and lips detection take place and gives Psychological feedback. In this we perform driver face Detection using camera which captures the image and Records the frame and color accordingly, which is used then for eyes and lips detection marked in the frame.*

Hence image processing with fuzzy logic gives the level Of fatigueless of the driver. A MiniGUI man-machine Interface is used to the display in the computer.

Key Words: FUZZY LOGIC, IMAGE PROCESSING COMPUTER VISION, MACHINE LEARNING.

1. INTRODUCTION

In today's modern world, transportation and the need for the use of the cars, bikes and motor cycles has tremendously increased over past few decades. The ever increase in the population is one of the reason behind the growing number of vehicles. In today's world the use of transportation requires lot of safety system and maintenance. Currently we are using vehicles with safety system that includes use of the brakes, air bags, seat belt etc. But these are only helpful post-accident and lack to alert the driver before the accident occurs. Driver fatigue detection system can be used for preventing the above problems without endangering human life and hence is one of the effective ways to stop accidents. In driver fatigue or Drowsiness detection system it depends on the motion of eye Blinking period, the time interval between them and also the movement pattern of the head. The system does not break down and it can be used for more advanced driver visual attention monitoring. The hardware system involves the usage of the IR illuminator Along with the implementation of the software that makes use of the fuzzy logic helps in the measurement of the level of alertness of the driver. The system has been tested in the day as well as the night environments hence can be able to work in the any of the environment. This paper involves implementation of the fuzzy Logic hence depending on different background environment and lights it can predict the fatigue state of the driver and warns the driver in advance in order to avoid the accident In Section 2 will discuss the algorithm of drowsiness and the section 3 will discuss the hardware and software implementation of the system.

1.1 ALGORITHM OF DROWSINESS DETECTION

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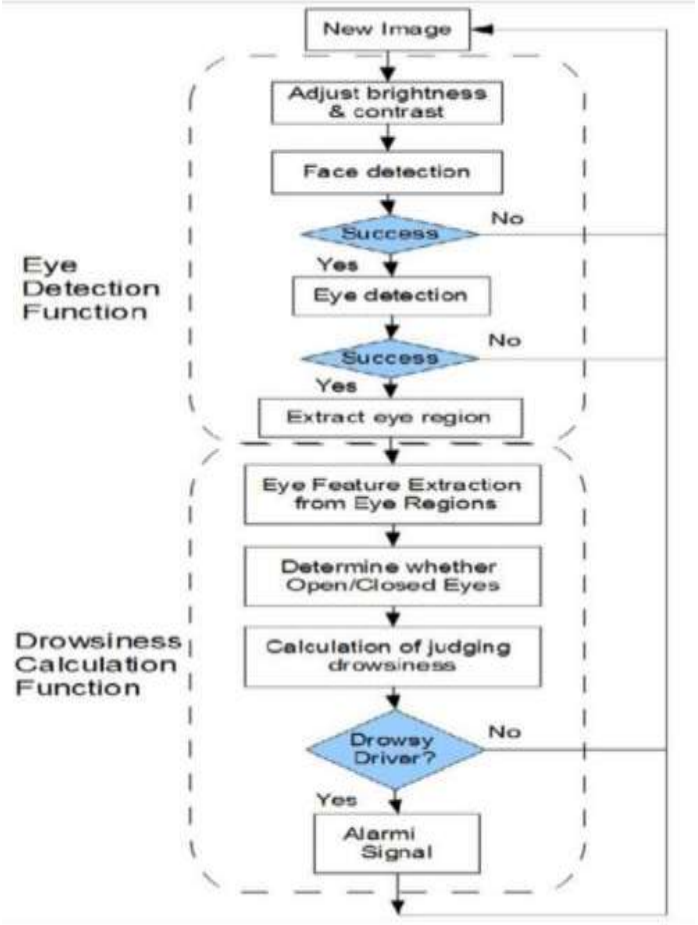
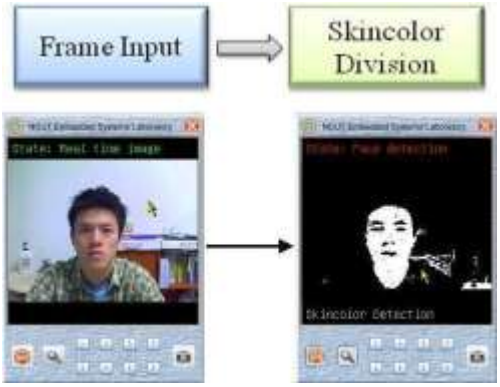


The new image is been input and is detected for the face detection. The image brightness and contrast ratios are adjusted for the detection of face and the later it undergoes the face detection if it is detected then it undergoes eye detection then the frame is adjusted around the eye region the eye region is extracted.

The patterns are then processing for the eye blinking, whether the eyes are open or closed during the driving of the car . Then the data has been for the calculation of the drowsiness that the driver possess with the help of the fuzzy logic. If the driver is drowsy then the alarm signal is set on to make the driver alert that he is undergoing drowsiness state and the driver needs to stop driving or needs precautionary measure before the driving of the car.

The first part is the eye detection function and the other is the Drowsiness Calculation function.



2. LITERATURE SURVEY

Some efforts have been reported in the development of the system to detect the drowsiness based on various factors like recording of head movements, heart rate variability, grip quality and movement of the steering wheel against the path markings on the road [2]. A drowsy driver detection system has been developed to concentrate the eyes of driver and check the drowsiness. Drowsiness detection techniques, in accordance with the parameters used for detection is divided into two sections i.e. intrusive method and a non-intrusive method. The main difference of these two methods is that the intrusive method, an instrument connected to the driver and then the value of the instrument is recorded and checked. But intrusive approach has high accuracy, which is proportional to driver discomfort, so this method is rarely used. [1].

The system has the capacity to choose whether the driver's eyes are opened or closed. At the point when the eyes are close for a really long time, a warning sign is issued to driver [2]. Explore a driver drowsiness monitoring and early warning system, which uses machine learning techniques, based on vehicle telemetry data. The proposed system can ensure safe driving by real time monitoring of driving pattern [3]. A solution for driver monitoring and event detection based on 3-D information from a range camera is presented. The system combines 2-D and 3-D techniques to provide head pose estimation and regions-of interest.

Based on the captured cloud of 3-D points from the sensor and analyzing the 2-D projection, the points corresponding to the head are determined and extracted for further analysis [4]. Ingenuity method that combined both computer vision and physiological bio-signals for drowsiness detection. Initially, PCA model indicated the face region; follow by determination of eye region using GA based on face segment. Photo Plethysmography (PPG) is analysed for its changes in signals waveform from awake to drowsy state [5].

“Eye-Gaze Tracking Method Driven by Raspberry PI Applicable in Automotive Traffic Safety” [6] comes as a response to the fact that, lately, more and more accidents are caused by people who fall asleep at the wheel. Eye tracking is one of the most important aspects in driver assistance systems since human eyes hold much in-formation regarding the driver's state, like attention level, gaze and fatigue level. The number of times the subject blinks will be taken into account for identification of the subject's drowsiness. Also, the direction of where the user is looking will be estimated according to the location of the user's eye gaze.

The developed algorithm was implemented on a Raspberry Pi board in order to create a portable system. The main determination of this project is to conceive an active eye tracking based system, which focuses on the drowsiness detection amongst fatigue related deficiencies in driving.

“Application of raspberry pi based embedded system for real time protection against road accidents due to driver’s drowsiness and/or drunk and drive cases” [7] deals with the application of raspberry pi CPU based sensing system to the detection of driver’s lethargy and alcoholism in order to avoid the road accidents. The embedded system consists of *5-megapixel digital camera, alcohol detection sensor and the buzzer interfaced to the microcontroller*. The embedded system is controlled by Raspbian operating system. The system detects real time situation of the driver’s vigilance and control over the vehicle. If alcoholic and / or drowsiness tests are positive, it switches on the alarm, following operation will be perform by the system.

(i) Turn off the vehicle’s engine via microcontroller-based program controlling ignition power source.

(ii) Sends a SMS to the person close to the driver’s location.

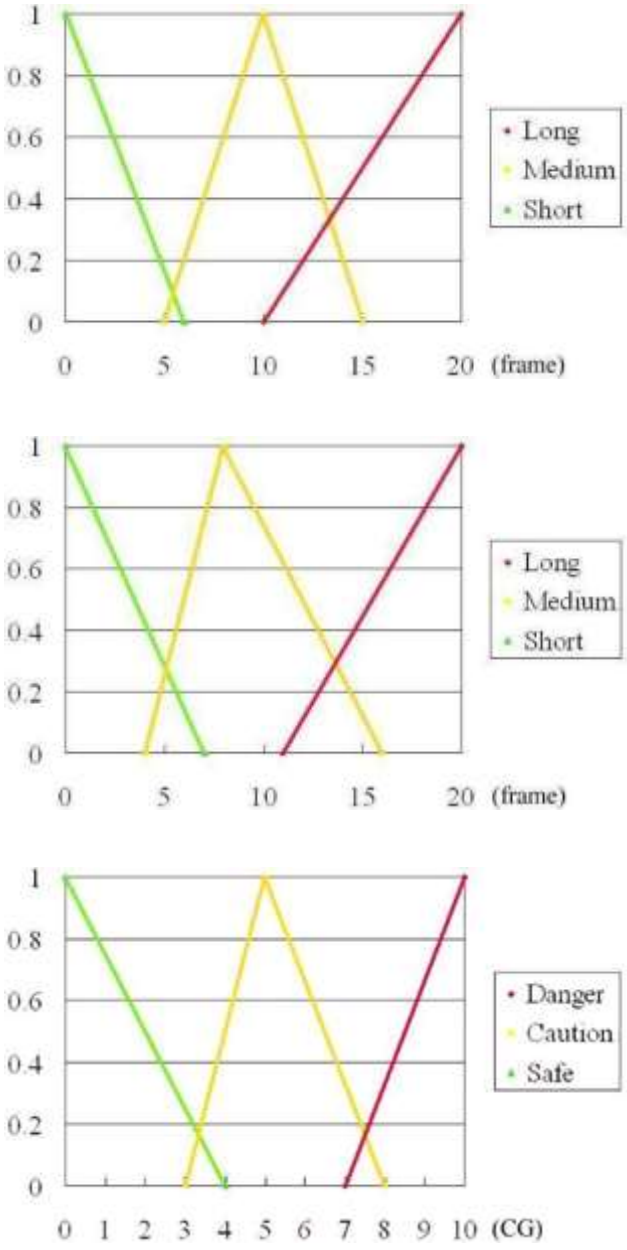
3. SYSTEM IMPLEMENTATION

3.1 HARDWARE

The hardware used is PC. The external hardware used is Logitech webcam which helps to capture images. Mother Board specification is Intel pentium4 processor Memory:

DDR226, USB Host and Device Port TFT LCD

3.2 SOFTWARE DEVELOPMENT



RULE 1 – LOW blink frequency and interval THEN SAFE

RULE 2- IF blink frequency short and interval medium then safe

RULE 3- IF blink interval short and interval is long then WARNING

RULE 4- If blink frequency is medium and interval long then WARNING

RULE 5 – IF blink interval medium and interval the same then WARNING

RULE 6 -IF blink frequency medium and Interval short then danger

RULE 7- IF blink frequency long and interval long then danger

RULE 8- IF blink frequency long and interval Medium THEN DANGER

RULE 9: IF blinking frequency is long and interval short then danger

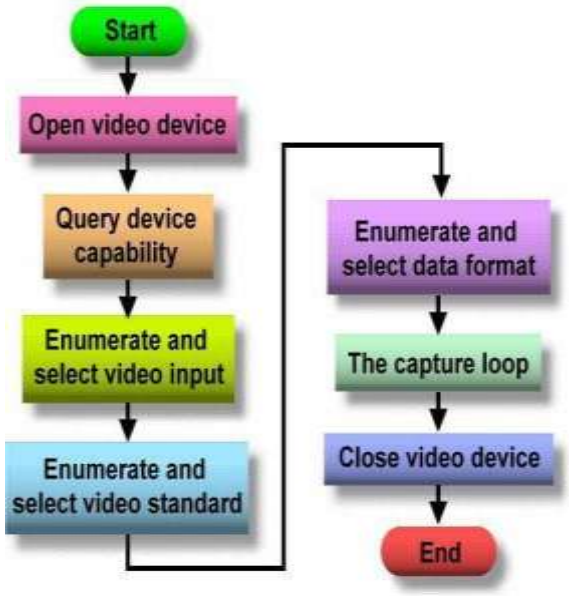
There are 2 types of development which are required for the designing of the system which are described below as follows

a.) Image Capture in Linux

b.) Building GUI Framework

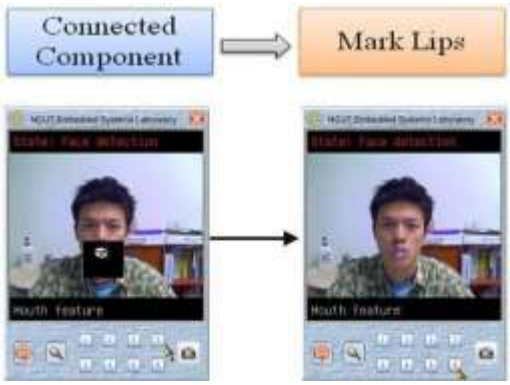
Image capture in Linux

To have more quantity of picture frame we use miniGUI .image programme simplification needs input as well as output program function by means of hardware interface driver.



Here video service is started open . we can make use of the query device capability which will ultimately helps in video standard selection. The data format is enumerated and it is further sent it to the capture loop .

Close the video device and the implementation of software is done. This is the step by step software implementation for the drowsiness detection system.



In this paper the camera installed on top of the mounted LCD the monitor where the driver sits in front of the camera and the same situation has been performed to carry out the degree of drowsiness and level of fatigue experienced by the driver

The rectangular blue box is seen during face recognition and can be traced further. The white and green box has been the frame has been used to trace the left and the right eye tracing respectively. Using this image processing and the fuzzy logic we can help early warn the driver about the accident and the fatigue state before the accident happens .

The system will warn the driver depending on the state of the sleepiness. Like for example the normal state will be displayed using graphical user interface and is displayed as safe for the driver to drive a car. And when the driver looks tired or a bit of the drowsiness state then the driver monitor as displayed as an alert to warn the driver to take rest or be alert wile driving. And if the driver is in the more fatigue state then the driver would be displayed as in the danger zone and to drive in the slow phase and be attentive to the instruction to avoid calamity.

4. CONCLUSION

The paper describes the fatigue detection using fuzzy logic as well as image recognition help of machine learning. The purpose of the designing of this system is to make the face recognition, face detection, drowsiness detection and warning the driver in the levels of fatigue and the level of alertness is displayed on the monitor with the help of graphical user interface. The use of intelligent systems as well as advanced communication technologies and the world of artificial intelligence can be used to help the man kind. In tackling day to day life problems. The drowsiness detection project will help to solve the major issues and it will ultimately help in avoiding major road accidents especially in the urban areas and cities where population is too high. The further commercialization of the product would be done will help us to successfully use it in the large scale and can also beneficial worldwide. The System has been very much up to the necessity and will eventually will be updated according to the needs and whatever problems one encounter while handling these intelligent system

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