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A Survey on Different Vehicle Driver Drowsiness Detection System

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ABSTRACT: The driver fatigue and loose attention while driving are the most important cause of traffic accidents. A direct way of measuring driver fatigue is measuring the state of driver i.e. drowsiness. So it is very important to detect the fatigue of driver to save life and property. Typical approach to deal with the problem of fatigue detection, are based on analysis of features with image processing such as blinking, yawing, drowsiness and other. Huge limitation is the short interval of time between each analysis that generally is few frames per seconds.

KEYWORDS: Image processing, Computer Vision, Face detection, Region of Interest, Landmark detection, Eye-Aspect-ratio, PERCLOS

I. INTRODUCTION

Nowadays the major causes of deaths are road accidents which are caused by driver's drowsiness. Especially the truck drivers who continuously drive for long duration, the bus drivers who route for long distances and even overnight buses are exposed to such a kind of problem. It is resulted as an overcast nightmare to passengers in each country. This is the major causes of enormous amounts of death in every country. Therefore it becomes an essential aspect to determine the methods to overcome this scenario

Presently, the drowsy drivers are detected based on the three types of methods which are vehicle based, behavioural based and the physiological based. A number of scenarios such as steering wheel movement, accelerator or brake pattern, vehicle speed, lateral acceleration, deviations from lane etc. are determined by the vehicle based method. As they detect any abnormal change in the above values it id suspected as drowsiness.

II. RELATED WORK

2.1 Real-Time Driver Drowsiness Detection System Based on PERCLOS and Gray scale Image Processing

This study develops a real-time drowsiness detection system based on greyscale image processing and PERCLOS to determine if the driver is fatigued. The proposed system comprises three parts: first, it calculates the approximate position of the driver's face in greyscale images, and then uses a small template to analyze the eye positions, second, it uses the data from the previous step and PERCLOS to establish a fatigue model, and finally, based on the driver's personal fatigue model, the system continuously monitors the driver's state. Once the driver exhibits fatigue, the system alerts the driver to stop driving and take a rest.

2.2 Driver Drowsiness Detection in Facial Images

Extracting effective features of fatigue in images and videos is an open problem. This paper introduces a face image descriptor that can be used for discriminating driver fatigue in static frames. In this method, first, each facial image in the sequence is represented by a pyramid whose levels are divided into non-overlapping blocks of the same size, and hybrid image descriptor are employed to extract features in all blocks. Then the obtained descriptor is filtered out using feature selection. Finally, non-linear SVM is applied to predict the drowsiness state of the subject in the image. The proposed method was tested on the public dataset NTH Drowsy Driver Detection (NTHUDDD). This dataset includes a wide range of human subjects of different genders, poses, and illuminations in real-life fatigue conditions. Experimental results show the effectiveness of the proposed method. These results show that the proposed hand-crafted feature compare favorably with several approaches based on the use of deep Convolutional Neural Nets.

2.3 Driver drowsiness monitoring system using Image Processing

Drowsy driving is one of the major causes of road accidents and death. Hence, detection of driver's fatigue and its indication is an active research area. Most of the conventional methods are either vehicle based, or behavioural based or physiological based. Few methods are intrusive and distract the driver, some require expensive sensors and data handling. Therefore, in this study, a low cost, real time driver's drowsiness detection system is developed with acceptable accuracy. In the developed system, a webcam records the video and driver's face is detected in each frame employing image processing techniques. Facial landmarks on the detected face are pointed and subsequently the eye aspect ratio, mouth opening ratio and nose length ratio are computed and depending on their values, drowsiness is detected based on developed adaptive thresholding. Machine learning algorithms have been implemented as well in an offline manner. A sensitivity of 95.58% and specificity of 100% has been achieved in Support Vector Machine based classification.

2.4 Drivers drowsiness detection in embedded system

It is difficult problems to make drivers drowsiness detection meet the needs of real time in embedded system; meanwhile, there are still some unsolved problems like drivers' head tilted and size of eye image not large enough. This paper proposes an efficient method to solve these problems for eye state identification of drivers' drowsiness detection in embedded system which based on image processing techniques. This method break traditional way of drowsiness detection to make it real time, it utilizes face detection and eye detection to initialize the location of driver's eyes; after that an object tracking method is used to keep track of the eyes; finally, we can identify drowsiness state of driver with PERCLOS by identified eye state. Experiment results show that it makes good agreement with analysis.

III. CONCLUSION AND FUTURE WORK

We have reviewed various techniques for detecting driver drowsiness and concluded that different techniques are suitable in different conditions. Vehicular based measures do not give accurate results. Hence image processing based methods are very famous among researchers. They are much simpler and user-friendly. Also, they give better results than vehicular measures. It's complexity increases if driver is wearing spectacles, but researchers are working on to remove this drawback. So, driver drowsiness detection using image processing is a very efficient way both in terms of cost factor as well as efficiency.

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