

Driver Drowsiness Detection using Machine Learning

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Abstract.

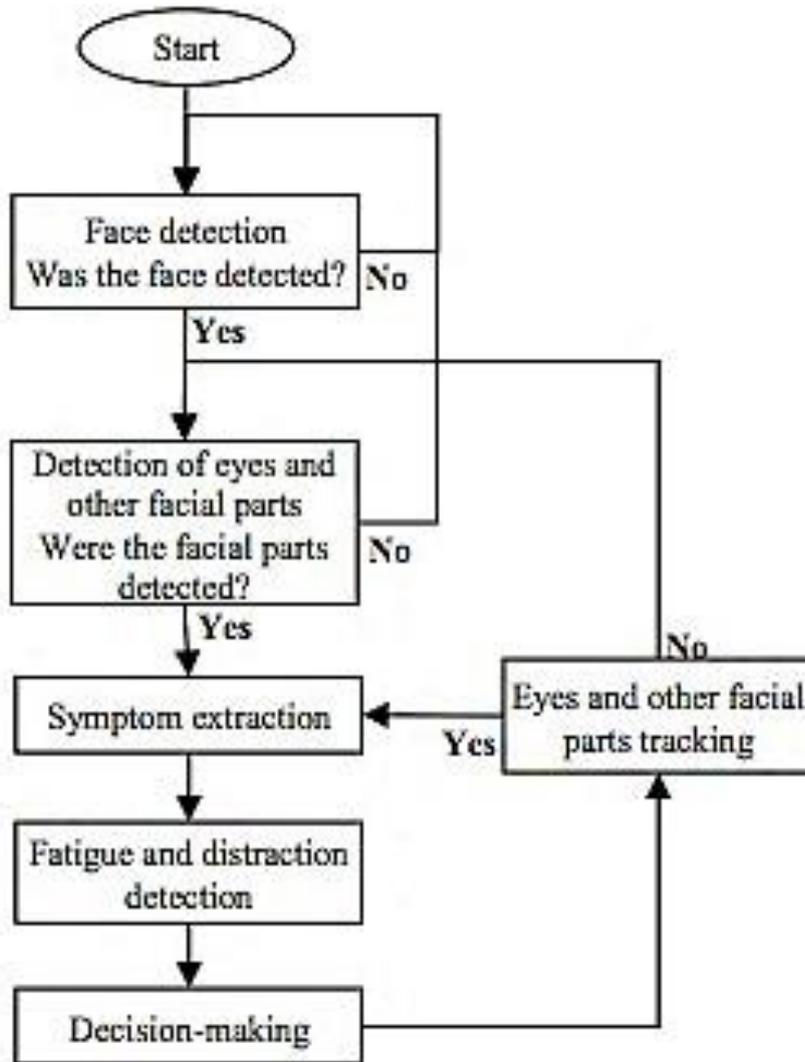
Driver drowsiness is a condition where the driver operating on the automobile is about to nod off or sleep which is caused by various factors, which can impair and hinder safe driving, including biological, physical, psychological, and other various factors. Accidents through driver drowsiness are observed especially in the case where journeys are long-distance, and sleep-deprivation also plays the role of a prominent determining parameter.

There are extensive number of accidents caused by driver drowsiness and these are of major safety concern, hence it is of critical importance to come up with some mechanism that can combat and prevent such road accidents to save precious lives. Thanks to technological advancements we can deploy systems that can detect driver drowsiness. In this paper, we would be reviewing the various techniques that can be used to implement a system for the detection of driver drowsiness.

Introduction

Fatal situations all over the world arise due to traffic accidents [1]. According to a global report produced by the World Health Organization in 2018, 1.35 million people die annually from road traffic accidents. The same report also highlights the fact that road traffic fatalities and injuries are the primary cause of death of children and young aged people, age group 5 – 29 years. Fatigue and drowsiness are a factor in almost one-third of a single-vehicle crash in rural areas [2]. Driver fatigue is a significant issue bringing about a huge number of road mishaps every year.

It is not possible to compute the specific number of fatigue-related mishaps however research shows that driver drowsiness might be a contributory factor in up to 20% of road mishaps and up to one-fourth of lethal and serious mishaps and accidents. A reliable and effective technique for the measurement of neurophysiological fatigue known as PERCLOS (percentage of closure)



is used to determine driver drowsiness. The project can facilitate vastly in reducing accidents that happen on roads due to driver fatigue. The ensuing harms of drowsy/fatigued driving may be even higher among commercial vehicles. Drowsy driving crashes are sometimes of high severity because of the driver's vital loss of management, usually resulting in unexpected vehicle flight and no braking response. Accidents through driver somnolence do not seem to be uncommon particularly on highways once covering larger distances. So, it is most urgent to come up with a reliable and relevant automotive safety technology, which is what the project aims at delivering and being contributive of.

METHODOLOGY

Driver fatigue detection systems use a variety of images and sensors through image acquisition equipment. This equipment helps to collect driver behaviour parameters and physiological parameters and other kinds of parameters. The parameters hence collected are used as input for the analytical model to comprehend the drowsy/fatigue level of the driver. Hence, called the objective fatigue detection methods. These methods are more reliable than subjective detection methods.

Therefore, objective fatigue detection methods have been mentioned as the focus of research in the field of engineering application and scientific research. This review paper focuses on objective detection methods. The objective detection method is divided into two major categories: driver facial features-based detection method and the driver physiological parameters-based detection method.

DRIVER FACIAL FEATURES BASED DETECTION METHOD

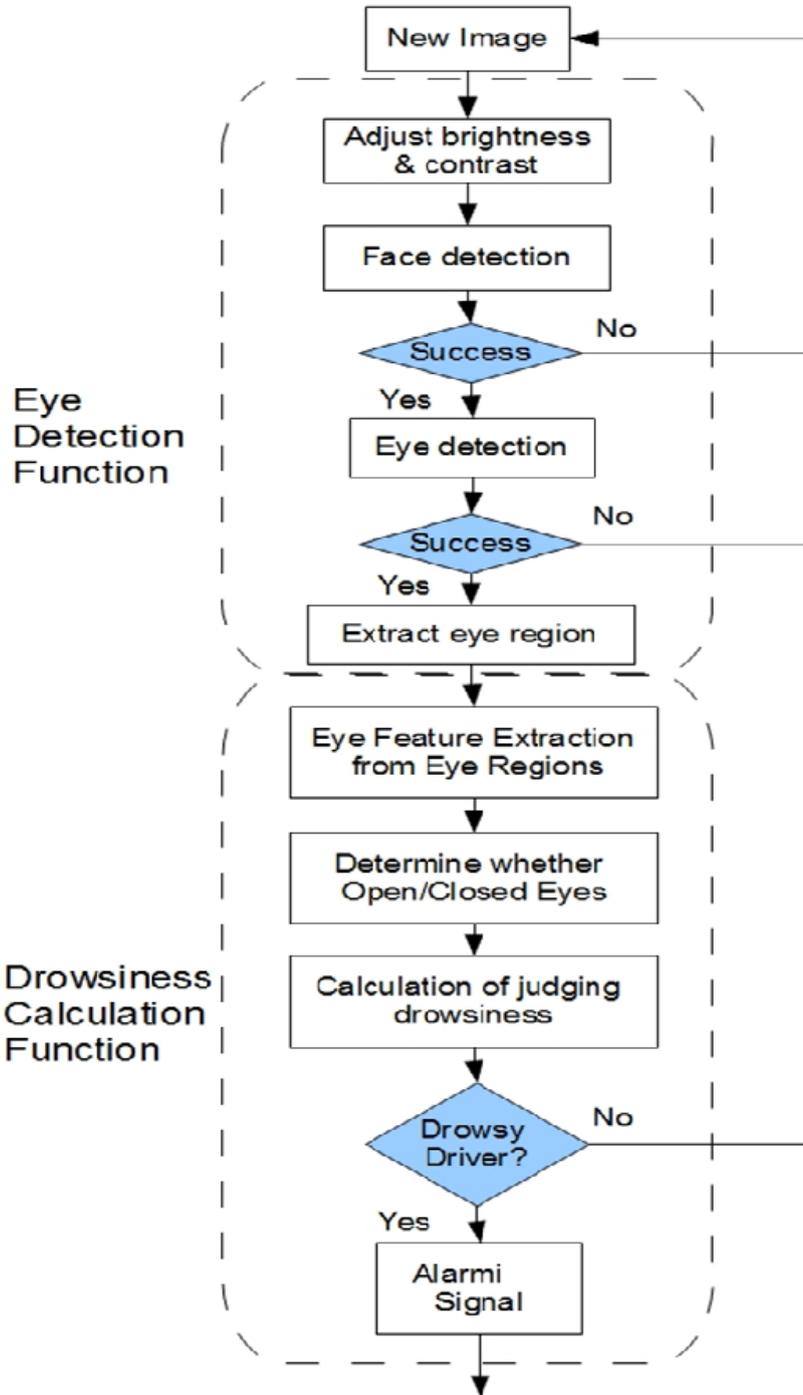
When the driver is in a state of drowsy/fatigued, the facial features of the driver will be quite different from that of the conscious state. Therefore, it is a much effective method to detect fatigue driving in real-time by continuously collecting and analyzing the driver's facial features data using some equipment. The changes in the facial and head features are more obvious and most easily detectable. The methods of detection include gaze direction detection, head position detection, mouth state detection, and blink frequency detection.

BLINK FREQUENCY DETECTION METHOD

It refers to the blinks per unit of time. When a driver is tired, the eye blink frequency rises from the normal value. We used computer vision (CV) technology to extract the driver's eye information and calculated its blink frequency. The so calculated blink frequency was then used to analyze the driver's fatigue.

Blink frequency detection method has advantages like real-time and high accuracy. Its robustness is poor because it can get affected by occlusion, driver's glasses, and other factors easily. With the development of computer vision (CV) technology, this problem can be overcome. Hence, eye blink frequency is an important fatigue evaluation index.

WORK FLOW DIAGRAM



CONCLUSION

The main objective of this project was to create a model that would predict if the driver is sleepy or not. Because of this project the driver can be warned if he/she is about to nod off .

References and bibliography

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