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REVIEW ARTICLE

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DRIVER DROWSINESS DETECTION TECHNIQUES – A REVIEW

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ABSTRACT

The most common cause of fatal traffic is due to driver's drowsiness and fatigue. In this study driver's drowsiness detection system through live video streaming is developed. Different techniques for driver's drowsiness detection are frame capturing, YCbcr color model for skin detection, Adaboost algorithm for face detection, eye and mouth mapping. The biggest flaw of this system is that it cannot detect fully covered face. This paper concentrates on analyzing techniques and to find proper way to improve driver's drowsiness detection.

Keywords— Driver's drowsiness, Face Detection, YCbcr Color Model, Adaboost Algorithm, HAAR Features.

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I. INTRODUCTION

Driver's drowsiness is a subconscious state of a driver which is caused due to lack of sleep. So, in order to avoid the road accidents due to driver's drowsiness we need to develop an efficient system through live video streaming. But it is very difficult to detect a fully covered face.

Due to rapid increase in number of vehicles there has been significant rise in road accidents. In day to day life, it is very difficult to drive in drowsiness state. Whenever driver is in drowsiness state, he himself is not aware of the state he is suffering from. In short drowsiness is always considered as an ignorant state even when driver is motivated. Whenever driver is in drowsiness state, the eye is affected the most.

This system includes detection of facial expressions and alerts driver of its state. The facial expression of the driver can be detected by capturing frames using live video streaming. This paper represents a framework to identify driver's subconscious state. For capturing driver's subconscious state live video streaming is used. Color can be considered for identification of skin pattern.

Driver can be alerted by the voice messages given after detection of drowsiness state by the system. For the classification of facial recognition,

YCbcr color model is used. YCbcr color model sub divides patterns into two parts i.e., black and white. We use adaboost algorithm for increasing efficiency and reliability of a system .Hence, efficiency of YCbcr color model can be increased by using adaboost algorithm.

II. LITERATURE SURVEY

This paper provides a monitoring system by Dr.Suryaprasad J, Sandesh D, Sarasvathi V, Swathi D, Manjunath S. For implementing a monitoring system which is real time and uses various techniques namely image processing and face or eye detection. For obtaining real time computation, Haarcascade amples are implemented. The Haarcascade sample gives a proper differentiation between blinking of an eye and detecting drowsy or fatigue state. System is consisting mainly 5 models such as Acquisition of video, dividing into frames, detecting face, detection of eye and drowsy state. Four features of this system are focusing of driver, detecting face, iris, blink and drowsiness, completely non-instructive system, cost effective. Some of te limitations of the system is that system fails to function if driver is covering his eyes with sunglasses and if camera which is directly affected due to light falling on it. Couple of areas for future scope are as a standalone product or implementation as smart phone application.[3]

This paper elaborates a method by Mr. Susanta Podder, Mrs. Sunita Roy based on monitoring eye status to improve safety of road for detecting Driver's drowsiness. Various stages included in drowsiness detection are through image acquisition, detection of face region, detection of eye region, detecting vertical eye position, extracting eye region, determining eye state and finally drowsiness detection. This paper discuss drowsiness detection. In case of head, a person who is drowsy he will always bend the head towards floor in car. These type of constraints can be used for further research. [4]

Proposes a method by Satori Hachisuka that provides detection of driver drowsiness though facial expression. The important aspects such as detection of driver's subconscious state to avoid road accidents is discussed. Driver's drowsiness detection will be identified by considering 17 feature points on face. This method may not be much efficient as others because of not taking proper action. This methodology may be efficient to minimize road accidents because of drowsiness of driver. In future it can be implemented in every car to reduce road accidents. [5]

Narrate a method proposed by A. Mary Sefia, J. Anitha Gnana Selvi which is based on detection of driver's drowsiness as well as inattentiveness. For detecting driver's state gabor ordinal measures and block matching algorithm is used. The proposed method have drawback for detection and noise. One advantage of this method is that it can implemented to work on lighting environment. [6]

Elaborates a method by Taro Nakamura, Akinobu Maejima, Shigeo Morishima for drowsiness estimation by combining information in facial feature point and textural feature information .Wrinkle feature was introduced which was not studied till that time and use to improve the accuracy. Further they tested the subject who was excluded from the learning data, and evaluated the corresponding RMSE and correct answer rate .Using an IR camera (60 fps frame rate and 320 x 240 pixels resolution) installed on the base of steering, we first record a video of river's faces while they are operating a driving simulator (freeway circuit track). Kitajima's facial expression estimation method is often used to estimate a driver's drowsiness degree9 , 15, 16] .Limitation is that if the wrinkle pattern on drivers face changes for some other reasons .Whereas the main advantage is that it is very sensitive to data collection. [7]

This paper describes a method given by Amardeep Singh, Amardeep Singh Virk based on real time detection of driver's eyes by image processing in MATLAB to detect whether the eye remains closed more than the fixed duration thus indicating condition of fatigue and raise an alarm which could prevent a collision. The driving support systems have been found lacking in detecting the influence of drug or alcohol causing great degree of risks to the commuters. This study has also found that eye blink patterns are unambiguously different

for persons under the influence of drugs and can be easily detected by the system designed by them. It uses MATLAB software to detect the eyes blinking. MATLAB has many more inbuilt function which are being used. Binarization, Detection of BW Boundaries, Vision. Cascade Object Detector these are the inbuilt method of MATLAB which are used in this method. After detecting the eye region from the input image (rgb) is converted into gray scale by using the syntax, rgb to gray (RGB) which is a inbuilt function in MATLAB. Main advantage is a viable option to design a continuous scale of drowsiness. Limitation is BAUMER Camera could work only on MATLAB2015 version and also required GigE adaptors settings. [8]

This paper describes the method for the detection of drowsiness using block matching algorithm. This system detects the eye behavior and determines the blinking of an eye and thus later take actions on it. Firstly it will detect if the eye is blinking or closed or not .Sometimes wrong detection can be done by the system while monitoring the closed eye. Hence the system detects the eye state for a long interval and while monitoring if the eye is found to be closed for more than three seconds, it is decided that the driver is in drowsiness state. In this, eye parameters are used to detect the driver drowsiness. The monitoring of the eye is done on the center of the eye using macro block. Macro block is a processing unit in photo and video formats. If the eye stop blinking or is closed for more than three seconds than it initiates that driver is in drowsiness state and thus the alarming system starts. The alarming system beep time interval can be changed as per the system view. [1]

This paper elaborates the method called GOM method. In this, Driver's reactions are monitored continuously. The camera in the system takes instant input of the driver's reactions. To determine the driver state and the drowsiness state, frames are matched in order to monitor the driver's reactions. Frames are continuously monitor the blinking of an eye. The method includes algorithm that is called GOM and it is used to determine the driver state. If the driver is found in an abnormal state, then the system alerts the driver with a sound of beep message by the system. And if this loop goes on for three consecutive times then the loop is stopped and the alarm is initiated by the system and thus alerting the driver from the drowsiness state. This loop works continuously to monitor the blinking of an eye. Frames are captured and then certain methods of preprocessing is done. The frames are than brought sequentially and thus monitoring is done of the driver's reaction. The impact of drowsiness can be reduced with the help of driver drowsiness detection system using video streaming. This system is able to detect the driver's drowsiness state and thus will alert the driver if drowsiness level reaches its limit. [2]

III. ALGORITHMS

A. *YCBCR COLOR MODEL*

YCbCr is a family of color spaces used as a part of the color image pipeline in video and digital photography systems. Y' is the luma component and C_B and C_R are the blue-difference and red-difference chroma components. Y' (with prime) is distinguished from Y, which is luminance, meaning that light intensity is nonlinearly encoded based on gamma corrected RGB primaries. YCbCr color spaces are defined by a mathematical coordinate transformation from an associated RGB color space. If the underlying RGB color space is absolute, the YCbCr color space is an absolute color space as well; conversely, if the RGB space is ill-defined, so is Y'CbCr.

B. *HAAR FEATURES*

Haar features are digital image features used in object recognition. They owe their name to their intuitive similarity with Haar wavelets and were used in the first real-time face detector. Historically, working with only image intensities (i.e., the RGB pixel values at each and every pixel of image) made the task of feature calculation computationally expensive. A Haar-like feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums. This difference is then used to categorize subsections of an image. For example, let us say we have an image database

with human faces. It is a common observation that among all faces the region of the eyes is darker than the region of the cheeks. Therefore a common haar feature for face detection is a set of two adjacent rectangles that lie above the eye and the cheek region. The position of these rectangles is defined relative to a detection window that acts like a bounding box to the target object.

C. *ADABOOST ALGORITHM*

The AdaBoost algorithm is one kind of self-adaptation iterative algorithm. It selects the most important features from a big feature candidate set and makes a weak classifier for every selected one. Then the multi weak learners are combined to a strong one. In this algorithm, every training sample is assigned a weight representing the probability to be selected into the training set by some classifier. If it is not classified correctly, its weight will be raised. Through this method, the AdaBoost algorithm could focus on the samples which are difficult to train. However, the classic AdaBoost algorithm still has the problem of slowly training speed and the detection results are over reliance on the training samples.

IV. CONCLUSION

About presented Article is literature review, examining current state of technique to avoid road accidents. Present state of art techniques have numerous issues and need to be solved. Above article survey eight articles in Driver drowsiness detection using image processing techniques. Future technique is to design and develop Driver drowsiness detection system using video streaming.

References

[1] Mandalapu Sarada Devi, Monali V.Choudhari, Dr.Preeti Bajaj, "Driver Drowsiness Detection Using Skin Color Algorithm and Circular Hough Transform", 2011 Fourth International Conference on Emerging Trends in Engineering & Technology.

[2] Mohammad Amin Assari, Mohammad Rahmati, "Driver Drowsiness Detection Using Face Expression Recognition",2011 IEEE International conference on Signal and Image Processing Applications.

[3] Dr.Suryaprasad J, Sandesh D, Saraswathi V, Swathi D, Manjunath S, "REAL TIME DROWSY DRIVER DETECTION USING HAARCASCADE SAMPLES", PES Institute of Technology-South Campus, Bangalore, India.

[4] Mr. Susanta Podder, Mrs. Sunita Roy,"Driver's drowsiness detection using eye status to improve the road safety", International Journal of Innovative Research in Computer and Communication Engineering – Vol. 1, Issue 7, September 2013.

[5] Satori Hachisuka, "Human and Vehicle Driver Drowsiness Detection by Facial Expression", 2013 International Conference on Biometrics and Kansei Engineering.

[6] A. Mary Sefia, J. Anitha Gnana Selvi, "Driver State Analysis And Drowsiness Detection Using Image Processing", International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-2, Issue-6,June 2016.

[7] Taro Nakamura, Akinobu Maejima, Shigeo Morishima."Detection of Driver's Drowsy Facial Expression ", 2013 Second IAPR Asian Conference on Pattern Recognition.

[8] Amardeep Singh, Amardeep Singh Virk, "Real Time Drowsy Driver Identification Using Eye Blink Detection", Volume 5, Issue 9, September 2015.