An efficient Framework to identify driver behavior using Mouth and Eye mapping

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Abstract

Majority of the road accidents happen due to driver fatigue which involves symptoms like yawning and closing of eyes. Thus yawning detection of the driver is needed. Therefore it is necessary to propose a system which will thwart road accidents. This system determines the level of driver’s inattentiveness and gives a forewarning when an approaching hazard appears. The existing system use face extraction based on support vector machine (SVM) and circular Hough transform (CHT) for detecting mouth. The current existing techniques although are not intrusive, they have several limitations and are expensive due to the hardware. Installing a system to alert drivers of their fatigue is a costly affair. Hence, the proposed system tries to fix this problem with by using Adaboost Algorithm. The cascade classifier based on Adaboost algorithm is used for tracking face components once the face has been detected.

Keywords: YCbCr color model, Adaboost classification, chroma components classification, threshold values.

I. INTRODUCTION

One of the main causes of road accidents is the driver’s fatigue. It can be advocated by the yawning of the driver. Thus, yawning detection systems are being introduced so as to detect the drivers’ tiredness. These systems are based on the eye and mouth movement of the driver. An alarm is set off to alert the driver in case yawning is detected.

In the project, a camera is placed in front of the driver to capture his/her facial movements. The drivers’ face is captured after every predefined time interval and is given as input to the system. The image captured is segregated to detect the skin area and then the skin is filtered out. Light enhancement is done in the segmented image followed by eye and mouth mapping. The eye and mouth pixels are counted and threshold values are compared to set off an alarm, when yawning is detected.

A family of the color spaces that are used in the color model pipeline in digital photography and video, is the YCbCr model. It is an encoded RGB information and not an absolute color space. The Y represents the luminance, whereas the blue difference and red difference chroma components are Cb and Cr respectively.

On detection of skin, skin segmentation is done. Continuous filtering of skin is required for this purpose. Facial features mapping is done based on this segmented image. Based on comparison of pixel count the alarm is set off. Installation of such a system is a costly affair. In proposed paper, for this purpose, Adaboost algorithm is used. 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. Adaboost is a common way to improve the correctness of given learning algorithm. It is generally used to determine the complication of object detection depending on cascade structure.

Chrominance also known as Chroma is the signal used in video systems. It conveys the color information of the picture, independently from the accompanying luma signal. Chrominance is represented as two color-difference components: \( U = B' - Y' \) (blue – luma) and \( V = R' - Y' \) (red – luma). Each of these difference components may have scale factors and offsets applied to it, as specified by the applicable video standard. In component Y’CbCr-encoded video, the chroma is carried in the Cb and Cr color difference channels of the video signal.

Threshold value is the Minimum or maximum value conventional for an feature, characteristic, or constraint) which aids as a standard for assessment or regulation and any fissure of which may call for a comprehensive examination of the condition or the restructure of a system. Thresholding is a method of translating a grayscale input image to a bi-level image by using an optimal threshold.

The resolution of thresholding is to excerpt those pixels from some image which characterize an object (either text or other line image data like graphs, maps). Global thresholding defines a solitary threshold for all the image pixels. When the pixel values of the components and that of background are equitably unfailing in their individual values over the complete image, global thresholding could be used.
In adaptive thresholding, dissimilar threshold values for dissimilar local areas are used.

II. LITERATURE SURVEY

YCbCr model is more effective in separating luminance from chrominance, when compared with other color models like the normalized RGB(rgb) and RGB. Apart from this, due to the statistical parameters like mean and standard deviation, that are available in the YCbCr model to separate out various types of pixels in the image[1].

For segmentation purpose, YCbCr model is used for elimination of the sensitiveness of illumination[2].

For the extraction of the skin regions of human, YCbCr color spaced-based skin model has been established, in its improved version[3].

The AdaBoost algorithm is one kind of self-adaptation iterative algorithm[4]. It selects the most important features from a big feature candidate set and makes a weak classifier for every selected one[5]. Then the multi weak learners are combined to a strong one. In the proposed paper, as observed, system installation for alerting drivers for their drowsiness is a costly affair; hence, the proposed system tries to fix this problem with enriched method by using Adaboost. The cascade classifier based on Adaboost algorithm is used for tracking face components once the face has been detected[6].

In this paper chroma subsampling is used for screen content coding[7]. The paper proposes the methods to improve the quality of chroma components used.

In this paper chroma vector analysis is used for detecting particular music part[8]. According to results, chroma components of music signals tend to have temporal correlation in time-frequency representation[9]. Thus time series of chroma components are analyzed and attempts are made to segments music parts from the other parts in the music TV programs.

In this paper a new approach is introduced for Traffic Sign Recognition. In this, candidate signs are independently found from two chroma components in the YCbCr space and then classified into three shape classes: circle, square and triangle based on measuring the rotated version correlations.

In the examination of Fingerprint Compression which uses SPIHT Technique in lieu of Substantial Threshold Level, to attain acknowledged level of compression, there is a requirement to compress the fingerprint images at a noteworthy threshold value.

In this notion, to accomplish great compression ratio, wavelet based SPIHT algorithm is used for compression of fingerprint image to get crucial choice of threshold level.

In the assessment of Real Time Driver Fatigue Detection Based on Eye and Yawning, the total thresholding produced on the eyeball color, for developing the eye pixels onto Y-axis.

In this approach, the dissemination of eyeball pixels on y axis is presented by disbursing an intensity map and subsequently, by taking the crags of such intensity map, we can get the height of the eyeball, which reproduces how profoundly a person is opening his eyes.

After attainment of the enumerated extent of the opening level of the eye, distinct threshold to discriminate amid opening eye and closed eye.

By using threshold value, we get anunalanced segmentation of the dark region inside mouth[10].

In the performance Analysis of Image and Audio Compression Method using Separate Wavelet Transform, the ECG signal to be flattened is disintegrated to the anticipated level using the threshold value selection which should be such that the eminence of the ECG signal is not prejudiced on restoration and a good amount of data decrease is also accomplished[11].

As we increase the level of decompositions for a particular wavelet, we get established numbers of detail coefficients threshold to zero as there is increase in threshold value[12].

III. PROPOSED METHODOLOGY

1. System Overview Diagram

2. The proposed work of our project follows the below mentioned steps
   - Skin Detection
3. Algorithm

[Diagram of the algorithm]

4. System Architecture

IV. RESULTS AND DISCUSSIONS

1. Precision can be defined as the ratio of the number of relevant yawning alerts raised to the total number of irrelevant and relevant yawning alerts identified. It is usually expressed as a percentage.

\[
\text{Precision} = \frac{A}{A + C} \times 100
\]

We observe that the tendency of average precision for the raised yawning alerts are higher compared to other systems.

Average precision of the proposed approach

2. Recall is the ratio of the number of relevant yawning alerts are raised to the total number of relevant yawning alerts identified. It is usually expressed as a percentage.

\[
\text{Recall} = \frac{A}{A + B} \times 100
\]

We observe that the tendency of average Recall for the raised yawning alerts are high compared to other systems.

Average Recall of the proposed approach
V. CONCLUSION

This paper proposed a new method for detection of driver drowsiness, by checking the yawing stages. Here in our proposed model we successfully accomplished the task of capturing an image from the web cam and store it in given specific path. The proposed method clearly over performs SVM method which indicates that the system is more efficient in yawning detection. The proposed system designs idea in breakdown model to evaluate yawning images by using Adaboost algorithm. Moreover, we have chosen to ignore complicated algorithms in order to achieve real implementation of the system. On the core part of the model application successfully detects the eye and mouth features so that the drowsiness of a person can be effectively identified.

FUTURE SCOPE

1. The system can be modified for the live cameras in vehicles.
2. We can enrich the system to get clear pictures from the camera using the technique called MIQM (Multi Image Quality Measurement).
3. The system can enrich to detect the yawning even in night by using Night Vision or Thermal Cameras.

REFERENCES

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