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A Cumulative Study on Yawning Detection Mechanism using on Stream Videos

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Abstract— Absence of yawning detection causes lack of driver fatigue detection leading to serious damages amongst all other road accidents. Driver fatigue causes 20% of fatal road accidents. The existing scheme used face extraction based support vector machine (SVM) and for mouth detection circular Hough transform (CHT). In this a vision sensor acquires face and then extracts the mouth if the environment is bright enough. The current existing techniques although are not intrusive, they have several limitations like vehicle type, driver experience, geometric characteristics, condition of the road, etc. The proposed method uses Adaboost classification and chroma components classification for yawning detection. In this the face detection is done by YCbCr, then the eye and mouth is detected. After calculating the chroma components and checking the threshold value, yawning is detected.

Keywords— YCbCr color model, Adaboost classification, Chroma components classification, Threshold value, Colour space.

I. INTRODUCTION

Fatigue in drivers while driving a vehicle is a major cause of many severe road accidents. There have been several researches done to detect driver's fatigue that would help to reduce the road accidents caused by the same. There are mainly two ways in which fatigue in person can be detected. They are based on driver's physiological state like heart beat, brain waves, and respiration and so on. Although these are considered to yield the most accurate results, they however are not feasible. Hence some other factors are used to detect the driver's fatigue. These factors are the symptoms shown by the driver that can be seen easily, eye and mouth movement are few such examples.

Various approaches are being put forth by different researches to detect driver's fatigue. The methodologies used till dates in the existing systems are 1) Support vector machine (SVM) and 2) Circular Hough Transform (CHT).

Support vector machine or SVM are basically supervised learning models that have associated learning algorithms, which are used to analyze the given data and perform pattern recognisation, which is useful for analysis of regression and classification.

Circular Hough Transform or CHT is a technique used in computer analysis, digital image processing and image analysis for feature extraction. Within a certain class of shapes, the technique finds imperfect instances of objects using a voting procedure. Circular Hough Transform is an extended version of the Hough Transform which mainly deals with the identification of lines.

To counter attack the afore mentioned methodologies our system introduces the technique of detecting driver's fatigue using YCbCr for detecting facial features like eye and mouth movement. Also, Adaboost classification and chroma components classification is used for yawning detection. The threshold value checked to evaluate yawning post the calculation of chroma components.

This paper is being classified into different sections like section II for literature survey and section III for conclusion.

II. LITERATURE SURVEY

Here a face recognition system is presented, using skin segmentation as feature reduction. The face region research in the image is reduced Human Skin detection. In addition, color skin is a robust information face to rotation; scale and illumination variation. The sin region is obtained using the skin color distribution from a training set. On a set of three databases, the proposed RGB-YCbCr skin color model for skin region segmentation was evaluated. The set was choice in both controlled and uncontrolled environment. The face recognition system is build by studying two classifiers; the K nearest neighbor applied for each channel of the segmented image, whereas as reduction method followed by knn classifier, the second used the Principal component analysis PCA. First one gives the best recognition rate [1].

To detect or recognize object, the detection of human skin is an essential basic step for the performance. In this scenario, a single pixel in HSV or YCbCr color spaces is being processed by popular methods. These approaches have limitations that they cannot address the wide range of distribution of the skin color. The method produces True Positif Rate (TPR) and False Positif Rate (FPR).The result is evidently higher, comparing those produced by single color models [2].

The facial area was predicted by the YCbCr elliptical model in specific surrounding, the occluded face was detected in various scenarios. Video monitoring sequences were obtained, through cameras, which were used to suggest an

occluded face detection method based on the YCbCr elliptical model. Then CamShift target tracking algorithm was applied for face tracking, then the external ellipses, connected area of target faces were selected. Lastly, ellipse method forecasted the area of the connected region was complicated with the face region. A sample abnormal behavior was used to identify if the occluded face was the normal behavior or not. Experiments were carried out and the conclusions showed that, the algorithm obtains almost optimum result in the field of detection accuracy rate, false alarm rate and detection and tracking speed [3].

Image processing methods use the YCbCr color space extensively. The inclination towards YCbCr is because of the rough coherence between visual aspects and the YCbCr constituents. However, as the chroma value increase, the image contrast decreases due to the nonorthogonality between YCbCr constituents. In this study, a contrast-protected chroma enhancement algorithm using YCbCr signals is suggested by forecasting the amounts of luma change needed to compensate for the lightness change induced by chroma enhancement. Numerical and psychophysical experiments have resulted in indicating that the suggested algorithm can effectively enhance the perceived image chroma and details [4].

AdaBoost algorithm is a way with which balanced dataset whose classes have alike proportions can be sorted. Although, it is natural that unbalanced dataset with a specific class of interest which has very small size exists in reality. As the algorithm may evaluate all the cases into majority classes avoiding loss of overall correctness, it creates problems. Here, improvised AdaBoost algorithm called BABoost i.e. Balanced AdaBoost is proposed. A higher priority to the misconceived examples from minority class is given by this algorithm. Observations have shown the new method to produce higher values of margin; hence, it is a better classification method. It also shows a decrease in the prediction error of minority class to quite an extent with increasing the prediction error of majority class in a small amount [5].

Adaboost is a common way to improvise the correctness of given learning algorithm. It is generally used to determine the complication of object detection depending on cascade structure. Nonetheless it has few drawbacks. Here a progressive Adaboost algorithm for object disclosure is proposed. This algorithm uses a new way to renovate weighted parameters of classifiers which are not strong. The flaw rate and their scope of positive recognition interest the weights. Improvisation achieved by the new algorithm is observed in experiments [6].

AdaBoost is used to create a classifier which is strong with linear merger of member classifiers. The chosen member classifiers controls the flaws in each repetition step while the training process. AdaBoost gives non-complex and proper way to create ensemble classifiers. The work of the ensemble depends on the diversity among the member classifiers. It also depends on the work of each member classifiers. Now, the existing AdaBoost algorithms focus on flaw minimization problems. Here a way to introduce diversification into the AdaBoost process to advance the work of the AdaBoost classifiers is proposed. The introduced diversity causes the Diverse AdaBoost algorithm to outshine Gentle AdaBoost. This research contributes to the method designing optimized ensemble classifiers with diversity [7].

Huge inaccurate positive face extraction is a compelling complication creating low execution face recognition in surveillance system. The execution can be expanded by plummeting these fake positives in order that non-face can be removed first prior to recognition. Here a combination of two algorithms to extract face in static images which decreases the false-positives enormously is presented. The algorithms used are Adaboost and Neural Network algorithms. It uses Haar-like features to detect the face rapidly using integral image. A cascade Adaboost classifier is used to expand the face detection speed. Neural network is used as the final classifier to verify face or non-face. Hierarchical Neural Network is used to increase the face extraction rate for a faster computing time. Experimental outcomes reveal that presented way achieves about 93.34% of detection rate and 0.34% of false-positives compared to original cascade Adaboost method which achieves about 98.13% of detection rate with 6.50% of false-positives. The processed images size is 240 × 320 pixels. Each frame is processed at about 2.25 sec which is slower than the original method, which only takes about 0.82 sec [8].

A new approach is introduced for the Traffic Sign Recognition (TSR) by using not only Principle Component Analysis (PCA) but also the Multi-Layer Perceptrons (MLPs) network. Chiefly the candidate signs are individually identified from two chroma components in the YCbCr space followed by division into three shape classes: circle, square, and triangle. It is based on enumerating the rotated version correlations. The usage of the PCA-based features of these objects will be in the MLPs as the training system corresponding to previously determined class. This method not only reduces the time but also boosts the performance of the recognition process. Hence this method is very advantageous. The designed method is appraised with over 500 statistic images for the accuracy rate up to 96% [9].

The Hue, Chroma, Intensity (HCI) space is very appropriate to colour images segmentation processing. This paper uses Fuzzy logic for integrating distinctive knowledge of the Hue component. There are several linguistic rules which have built a symbolic cooperation between Hue and Intensity according to Chroma. Based upon that, a region growing segmentation with fuzzy aggregation is introduced. This is followed with fuzzy segmentation being compared with a technique using a Fuzzy C-Means algorithm in different colour spaces [10].

This paper proposes a passive image tampering detection method. It is based on modeling edge information. The image chroma component's edge image as a finite-state Markov chain is modeled and low dimensional feature vector from its stationary distribution for tampering detection is extracted. The support vector machine (SVM) is utilized as classifier. SVM evaluates the effectiveness of the proposed algorithm. There are experimental results in a large scale of evaluation database. The results show that the proposed method is promising [11].

In this paper, a music part detection method is presented. It incorporates chroma vector analysis for use with music TV programs. According to results, music signals have a periodic chord sequences, hence envelopes of chroma components of music signals tend to have horizontal correlation in time-frequency representation. Here horizontal correlation refers to the temporal correlation. Based on this fact, time series of chroma components are analyzed and

music parts in music TV programs from other parts are attempted to segment. An F-measure of 0.78 is showed by the experimental results. This value is better than that obtained using the previous method [12].

MTS is a new pattern recognition method amongst the many existing pattern recognition methods. Applying MTS, any unknown person can be distinguished based on Mahalanobis space, measurement scale and threshold value. Experience threshold is often used in MTS. An unreasonable threshold will give a wrong conclusion in practice; hence a reasonable threshold is necessary to MTS. In this paper, the authors give the fuzzy algorithm steps. These steps determine the threshold of MTS as stated in the Fuzzy Set theory. An example application analysis presents that this approach is a more scientific and reasonable approach to find out the threshold [13].

Breathing movement may have its adverse effects in the imaging of positron emission tomography/computed tomography (PET/CT). To reduce these adverse effects due to breathing movement, Gating technique is used commonly. The quality level of respiratory motion gating will be directly affected by Gating threshold value selection, which easily leads to an inaccurate gating. Inaccurate gating may take place, as most methods of gating threshold value selection are implemented by manually determining. Hence, exploring an effective method of determining the gating threshold value for respiratory motion gating is very crucial. As per in the study, a method to automatically determine the threshold value was proposed. This method made use of the slope rate relationship between the adjacent absolute errors of coincidence events. Geant 4 application tomographic emission (GATE) software package is used. It is used to simulate realistic PET/CT scanner. Geometry phantom for respiratory motion simulation is also built. Compared with the manually threshold value calculation, the proposed method can make the result of gating correction closer to the real situation. The results illustrate that the method of automatic determination of the threshold value can efficiently and automatically determine the threshold value. The proposed method of automatic determination of threshold value also overcomes the limitation of the manual threshold value determination [14].

In this paper, a new method for solving the two-sided matching problem is presented. Preferences are given by two-sided agents. These preferences are represented in the format of strict order relations and threshold values. The two-sided matching problem with strict order relations contemplating threshold values is firstly described. Also there is introduction of concept of two-sided matching. In order to solve the above two-sided matching problem, the strict order relations are converted into Borda score matrixes and there is transformation of threshold values into threshold Borda scores. According to the Borda score matrixes as well as the threshold Borda scores corresponding to the threshold values, the comprehensive Borda score cut matrix can be constructed. Moreover, based on the comprehensive Borda score cut matrix, an optimization model is created. The matching substitute can be determined by solving the model. Finally, an example is given to illustrate the use of the proposed method [15].

In this paper, an estimation method of a threshold value for electrical interconnect tests is proposed. This method will mainly detect open defects at interconnects between dies in a 3D IC. This estimation method derives the threshold values. These threshold values are of a circuit made of our prototyping IC on a printed circuit board. According to the results, resistive open defects with resistance larger than 16.1Ω can be detected with a threshold value obtained by the proposed method [16].

III. CONCLUSION

All the methodologies mentioned in section I are having some minor or major flaws in the area of yawning detection. So, as an alternate step towards this, the proposed system introduces some ideas based on the detail studies of some work mentioned in the literature survey

So, the proposed system works on the idea of detecting driver's fatigue using YCbCr for detecting facial features like eye and mouth movement. Also, Adaboost classification and chroma components classification is used for yawning detection. The threshold value checked to evaluate yawning post the calculation of chroma components.

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