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Survey on Integrated Design of Smartphone Interface with Multiple Image Processing Methods

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Abstract

The direct light from the projector is harmful to the speaker's face when facing digital projector. So the digital projector with smartphone is used to reduce the shining light from projector and thus protect the speaker's face. First, the smart phones capture the speaker's location including projector screen. After captured the image it undergoes preprocessing methods are face detection, back-ground differencing, skin color recognizing method and ROI. After the preprocessing the location of the speaker's face is detected and the smart phone super imposed the black mask over the speaker's face [1].

I. Introduction

Now digital projectors are using in most schools and confer-ence rooms. The back projection phenomena are used effec-tively for decreasing the shining light from the projector. But price of these products are too costly. It requires large space, projection distance, and installation height and projection size. In the existing system TD technique is used to recognizing the movement of an object. In this technique the movement of an object is recognized by subtracting the images. An image include moving object, if result is zero otherwise an image contain moving objects. It provides incomplete information and shape of the moving objects. So background subtraction used for recognizing the movement of an object. In back-ground subtraction movement of an object is recognized by extracting new image from the whole image [1].

Either learning based or feature based method are used for identifying the speaker's face. In learning phenomena the lo-cation of the face can be detected by comparing whole images along with neural network but this leads to detection failure. But this leads to detection failure. Feature-based detection mainly handles facial features.

II. Harware Architecture

This design uses the smartphone, digital projector, an em-bedded board with ARM 11. The smart phone is placed above the projector. The smart phone first captures the projection screen area. When the speaker enters the projection screen

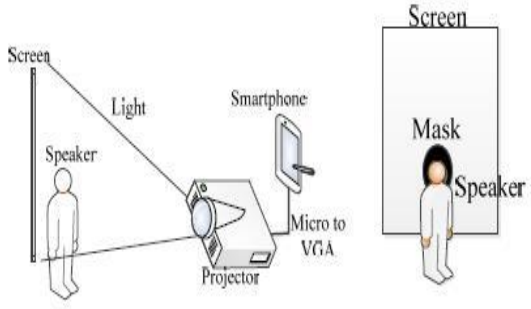

Fig. 1. Architecture design

area then the smartphone captured the more images and under-goes pre-processing steps such as face detection, background differencing, skin color recognizing method and ROI. After the pre-processing this design transfers the slide frame with black mask to the digital projector and superimposed on the speaker's face. Multiple cores are used inside the smartphone. Therefore two or more processors are executed simultaneously [1].

III. Multiple Image Processing Methods

A. Background Subtraction

The background designing methods are categorized by Basic Background, Statistical Background, Fuzzy Background and Background Evaluation. This design is based on Statisti-cal Background Modeling. Because, the background of the projection screen does not changed.

The TD technique is used to recognizing the movement of an object. In this technique the movement of an object is recognized by subtracting the images. An image include moving object, if result is zero otherwise an image contain moving objects. It provides incomplete information and shape of the moving objects. So background subtraction used for recognizing the movement of an object. In background sub-traction movement of an object is recognized by extracting new image from the whole image [10].

The advantage background subtraction method is: the image is subdivided into foreground and background and process only the portion of the picture that contains the appropriate information. The image is first transformed to Hue, Saturation and Value model to reduce the computation of image process-ing.

To find the moving object, the software first establishes the background image and subtracts it from the continuous image from the output of the smart phone. If the threshold is greater than1 then pixels of the foreground image is set as 1, otherwise 0. The median filter is used to filter out the salt and pepper noise in the foreground image. The complete and clear foreground image can be obtained by using morphological methods [10].

The advanced Background subtraction is GMM. The back-ground pixel is depicted by a GMM. The GMM consist of K three-dimensional Gaussians. The pixels of foreground image of a HSV vector does not come down within a range of mean vector of the K Gaussian components, this pixel is denoted as foreground pixel otherwise, it is denoted as background. The number GMM component is 1 in statistical Background. AGMM model is the enhanced algorithm of GMM. This is the powerful background differencing technique. It can manage lighting changes and repetitive motion [11].

A multilayer codebook- based background subtraction method is used to detect the object movement. Codebooks are used to store compressed data. MCB model use block and pixel codebooks for increasing the performance of foreground detection. The single object detect as multiple object. The MCB perform in opposition of noise and edge smoothening [12].

B. Face Detection

Either learning based or feature based method are used for identifying the speaker's face. In learning phenomena the location of the face can be recognized by comparing whole images along with neural network but this leads to detection failure. But this leads to detection failure. Feature-based detection mainly handles facial features. In this design, face is recognized by viola/ Jones method along with learning-based technique. The Viola /Jones procedure use cascade of classifiers. This method gives good estimation and correctness.

The Viola/ Jones method consist of integral image, Adaptive Boosting learning algorithm and cascading classifiers. The fast and powerful way of computation is provided by the integral image. The digital images features are described by the addition of pixels inside the rectangular region are subtracted.

The few parts of captured images are examined by the neural network [9], and choose whether each part consist of face. The two steps are involved in the identification of face by Neural Network. The filter is used in the first which is connected Neural Network. The received input image generate an output ranges from 1 to -1, depicted the occurrence or absence of a face. Merging Overlapping Detections and Arbitration is used in second phase. The advantage of this method is less estimation and its disadvantages are complex procedure and incorrect result. This design uses the viola/Jones face recognition procedure together with neural network.

The face also recognized by features of face, segmentation of skin color and properties of regions. The skin parts are segmented by using RGB , HSV and CIELAB. The segmented images are transformed to the binary form. The binary images are transformed into skin colored part and non skin colored part. The skin colored parts are avoided by when skin part is smaller than the average value, the skin part does not contain several holes, eccentricity is greater than 0.89905[8].

C. Skin Color Detection

In [6], the complete presentation of different color spaces for skin identification is evaluated by using Multilayer Perceptron artificial neural network (MLP). The color and color-texture characteristics are used to determine the accurate color space. The distinction between color spaces is discarded by the combination of color and texture. More accurate and efficient skin can be identified by this method.

Do Hyun-Chul and You Ju-Yeon [8], the skin color identi-fication can be enhanced by using static model. The color of an estimated illuminant under various lightning conditions is transformed to canonical illuminant. The illuminants of color is first evaluated from the pel in the sclera portion of the eyes, and then transformed to a canonical color for skin color identification.

In [7], presents a real time skin color identification procedure which consists of dynamic adaptation and color correction strategies to handle rapidly changing lightning conditions. The skin color models are updated by using dynamic thresholding procedure under Bayesian decision framework. The skin color models are updated only if lightning conditions are changed.

D. Region of Interest

The speaker's height cannot change. When performing the image processing this design can remove the region of the speaker's height that is above the ROI. The computation time for processing an image is reduced by using ROI [1].

The SAD [2] estimation is reduced by motion estimation procedure to finding the least matching error. The motion vector prediction don't use by FFS algorithm because it is related to any difference compared to FSA. It uses only two simple methods, median and mean prediction methods, because the important point of employment the prediction of motion vector is not the performance of the algorithm of motion vector prediction but getting an optimized order of regions to search.

Brazdilova and Kozubek [4] identified blind division and object-based division as the two main types of image division. While object-based image division is very complex due to its consideration for content objects during the image division, the

blind approach is very simple and fast because it completely neglect the content objects.

In Caron et al. [3], explain the blind division used in an unsupervised ROI detection framework, where the resulting sub-images is described using power law modeling (Zipf's Law).

IV. Conclusion

This design uses the smartphone together with projector to decrease the strong light from the digital projector. The smart phone performs the face identification procedure, skin colour identification procedure and background subtraction procedure. The face identification procedure is used to identify the speaker's face. The skin colour recognition procedure is to identify the skin colour of a captured image. The background differencing procedure is used to avoid the background of a whole image. After performing above image processing procedures, the black mask is puts on the speaker's face. This helps to decreasing the shining light from the projector. This design identifies the more speaker's face and the mask is puts on the speaker's face as one mask. The mask radius tracks the object movement. The mask radius change along with the movement of an article [1].

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