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A Review: Skin Color Segmentation

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Abstract: Skin color segmentationis used to determine whether the color pixel is a skin color or non skin color. Understanding the skin color segmentation which supports to design YCbCr and CIELab algorithm for skin color segmentation which use in various applications such as face detection, human computer interaction, medical x-rays scan, agriculture. In this paper we discuss on face detection algorithms based on skin color. Two color spaces RGB, YCbCr are of main concern. It combined the Crowley and Coutaz (1997) algorithm for RGB and cahi and ngan (1999) algorithm for YCbCr to get a new skin color based face detection algorithm which gives higher accuracy**.**

Keyword: YCbCr color model, RGB color model, Segmentation, Comparison.

I. INTRODUCTION

The Paper present has been divided into following sections. Introduction starts with section 1.1 which covers the concept of digital image. Section 1.2 describes introduction about skin color segmentation. Section 1.3 deal with YCbCr model.

1.1 Digital Image. An image is considered to be a function of two real variables. For example, a(x,y) with aas the amplitude (e.g. brightness) of the image at the real coordinate position (x,y). An image may be considered to contain sub-images sometimes referred to as regions of interest or simply regions. A digital image is digitized to convert it to a form which can be stored in a computer's memory or on some form of storage media such as a hard disk. Once the image has been digitized, it can be operated upon by various image processing operations like zooming, noise reduction, compression, enhancement and many more.

1.2 Skin color segmentation. The Skin color segmentation is a promising research field in computer vision. Its basically use applications are development of more effective and friendly interfaces for human computer interaction, face detection, faces tracking, content-based image retrieval systems and gesture analysis. It can also be used for medical applications. Last but not least it can also be used as biometric feature in mobile security problems. Skin color segmentation is used to determine whether the color pixel is a skin color or non skin color. Good skin color segmentation is that in which segment the every skin color whether it is blackish, yellowish, brownish and whitish and gives good results under different light conditioning as possible. There are different color spaces have been used for color classification. Color classification is done by using chrominance component because it is expected that skin color segmentation may become sturdier to lighting variations if luminance component is discard 1.3 deals with YCbCr model. In the YCbCr Color Model also written as YC_BC_R or $Y'C_BC_R$ 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 components and C_B and C_R are the blue difference and red difference chroma components is distinguished from Y which is luminance meaning that light intensity is non linearly encoded using gamma correction. Y′CbCr is not an absolute color space rather than it is a way of encoding RGB information. The actual color displayed depends on the actual RGB primaries used to display the signal. Therefore a value expressed as Y′CbCr is predictable only if standard RGB primary chromaticity is used.

II. LITERATURE REVIEW

Author has been explained the proposed a new algorithm for skin color segmentation. YCgCr color space is chosen and new skin color segmentation based on Gaussian distributionmodel and space information of an image is proposed. Firstly the skin color sample images are light compensated and transferred from RGB to YCgCr color space. Secondly the Gaussian skin color model is established from 179221 skin pixels. Thirdly the skin like similarity is computed and the skin color similarity image is obtained. Finally a fast 2D Otsu method is used into skin color segmentation. To reduce the computational amount an improved 2D Otsu method is proposed to skin color segmentation in YCgCr color space. The whole segmentation process consists of illumination compensation, establishment of the Gaussian skin color model, computation of the skin like similarity degree and segmentation by the improved 2D Otsu method. Experimental results show that the proposed algorithm is competitive. [4]

Author has been explained in the implemented a skin color classification algorithm with color statistics gathered from YCbCr color space. Studies have found that pixels belonging to skin region exhibit similar Cb and Cr values. Furthermore, skin color model based on the Cb and Cr values can provide good coverage of different human races. The thresholds be chosen as [Cr1, Cr2] and [Cb1, Cb2] a pixel is classified to have skin tone if the values [Cr, Cb] fall within the thresholds. The skin color distribution gives the face portion in the color image. This

algorithm is also having the constraint that the image should be having only face as the skin region. [10].

Author has been explained the purposed one of the simplest algorithms for detecting skin pixels is to use skin color algorithm. The perceived human color varies as a function of the relative direction to the illumination. The pixels for skin region can be detected using a normalized color histogram and can be further normalized for changes in intensity on dividing by luminance. And thus converted an R, G and B vector is converted into an r and g vector of normalized color which provides a fast means of skin detection. This gives the skin color region which localizes face. This algorithm fails when there is some more skin region like legs, arms, etc. [9]

The Author has been introduce a newly developed method of human skin color detecting and segmentation under different challenges. The skin colors are first fully decorellated using the adaptive color PCA and then segmented using the modified elliptic boundary model. It can be observed from the experimental results that the proposed method successes in skin color detecting and segmentation for different ethnic groups and imaging conditions. The proposed method provides the following advantages in such a way thatit doesn't associate with any special color spaces or lighting conditions. Secondlyhigher accuracy is obtained because the ellipsoid approximates the cluster of vectors more precisely than other famous color models and lastly it has a relatively low computational complexity.

III. PROBLEM STATEMENT

The study is entitled “To Design YCbCr Algorithm for Skin Color Segmentation”. Skin color is a simple but powerful pixel based feature which has proven to be a useful and sturdy cue for face detection, localization and tracking, hand detection etc. This dissertation propose color spaces YCbCr algorithm for analyzing the efficient method for skin color segmentation under varying lighting conditions which can improve the performance of face segmentation under poor or strong lighting conditions. Skin color is a useful means for human face detection.

In earlier research filtering is also not used up to that extend. In our work use filtering, it will give efficient result during segmentation. So the main emphasis is on the development of YCbCr algorithm for skin color segmentation which use in various applications such as face detection, human computer interaction (HCI), medical (X-Rays Scan), agriculture etc. These algorithm are implemented in MATLAB.

IV. OBJECTIVES

The significant aim of this research is to analyze the efficient method for skin color segmentation under varying lighting conditions which improve the performance of face segmentation under poor or strong lighting conditions.

The objectives of this research work are following:-

1. To study the image segmentation of digital image processing.
2. To study various color models such as RGB and YCbCr.
3. To design the YCbCr color model algorithms for skin color segmentation.
4. To analyze the results of segmentation of YCbCr color model algorithm.

V. PROPOSED METHODOLOGY

In the present research work YCbCr algorithm has been designed for skin color segmentation. This section describes an algorithm that explains the steps to be used by which the YCbCr deals with web images for skin color segmentation.

This algorithm takes RGB image as input image and applies grayworld for illumination. Transformations are applied for calculating the scaling factor and the RGB image is converted into YCbCr by apply threshold values for skin color detection. After skin color segmentation, noisy image is obtained that is filtered by median filter. For further refined image morphological operation are applied on image. Here the overall working of YCbCr algorithm is briefly described in an algorithmic notion.

Steps of segmentation of image with YCbCr color space are given below:

Step 1. Initialize RGB as input image.
Step 2. Initialize binary output image.
Step 3. Apply Gray world for illumination compensation.
Step 4. Now pick the R, G, B components of the input image
Step 5. Inverse of the average values of the R, G, B.
Step 6. Now pick the smallest average value (MAX because we are dealing with the inverses).
Step 7. Calculate the scaling factors and scale the values.
Step 8.RGB image is converted into YCbCr by applying the threshold values for skin color detection.
Step 9. Mark skin pixels.
Step 10. After skin color segmentation, we get noisy image that is filtered by median filter.
Step 11. For further refined image, apply the morphological operation on image.
Step 12. Exit.

VI. CONCLUSION AND FUTUREWORK

In this paper, we have been proposed the YCbCr algorithm which can be used for segmentation of skin color properly. The proposed implemented part has not been explained in this paper. The implementation part will be covered in the

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next paper, which will demonstrate the real working of proposed Algorithm.

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