International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 2 Issue 9, September - 2013

Detection Skin COLOR Pattern in Post Script Document Using Region Labelling Approach

[1] Gururaj P Surampalli
GNDEC Bidar

[2] Gurusiddaraj Konded
GNDEC Bidar

[3] Giriraj Patil
GNDEC Bidar

Abstract

Human skin detection suffers from various challenges due to variation such as image conditions, size, resolution, rotation and background. The accurate and robust detection has been a great task. There exist numbers of methods. Skin detection find vast application in the area of face detection. Face detection demand is growing with a rapid speed because of its vast application in the field of computer vision. The implementation of different security methods as such face tracking, face recognition, expression recognition and pose estimation all this methods requires face detection algorithm methods. As it got a lot of challenges variation in poses, facial expression, illumination and occlusion the demand of face detection is still high because of its non-intrusive nature. Because unlike other face detection method gives better identification for security and best result than any other bio-metric detection methods. Face detection is not only the initial step of any automatic face recognition system but also for human computer interaction system, object recognition and detection and many surveillance systems.

1. Introduction

Automatic skin detection is a common primitive for a range of human-related image processing applications, including speaker recognition and speaker location, the detection of pornographic material and video data indexing. Pixel-level skin search can be very rapid and can greatly reduce the search space prior to higher level classification. Thus such detectors are often used as front-end primitives to higher level person and face location systems [3][1].

There are studies which suggest that the majority of existing face detection methods use image grey values to detect faces in spite of the fact that most images today are color. Few approaches to face detection that utilize color information, like search for elliptical image regions after segmenting color images using the hue and saturation components from the Hue, Saturation, Value (HSV) space. Pixel-level skin searches can be very rapid and can greatly reduce the search space prior to higher level classification. Thus such detectors are often used as front-end primitives to higher level person and face location systems [4].

Skin pixel detection is very important in finding the skin region in around the image, its challenges involve

Color space: Finding the best suitable color space to detect the skin pixel is very important

Complex background: Extracting the skin pixel or detecting or separating the skin pixel from non skin pixel from complex background requires efficient skin pixel detection algorithm with exact range of value for the skin pixel.

There are many color spaces for detecting skin pixel. But there is problem of the illumination present in the images which most of the color spaces ignores. The origin of the person also determines the type of skin and its color. That is skin color varies from person to person and region to region which itself is a very challenging task columns.

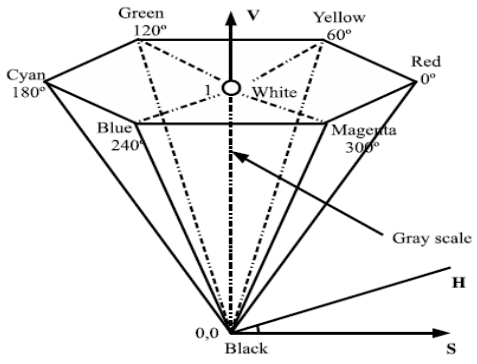
2. Recognition of skin pattern

Most existing skin segmentation techniques involve the classification of individual image pixels into skin and non skin categories on the basis of pixel color [2].

It is not an easy task to extract regions of specific color from a given test color image, since the color of an object changes with illumination [4]. It is found that separating illumination from chrominance can produce good result in detecting skin pixel [3].

Object detection has been a focus of research in human computer interaction. Skin area detection has been a key to different recognitions like face recognition, human movement detection, pornographic and nude image prediction, etc [7]. Most of the research done in the fields of skin detection has been trained and tested on human images of ethnic origin such as African, Mongolian and Anglo Saxon [8]. Pixel based skin detection can narrow the search space prior to high level layers however this is not an easy task [9]. The purpose of a color space is to facilitate the specification of colors in some standard, generally accepted manner [10][5]. The spectral measurements over the visible spectrum have different discriminatory information for the task of face identification [11]. Color classification is done using only pixel chrominance because it is expected that skin segmentation may become more robust to lighting variations if pixel luminance is discarded [6].

In color image processing, the color spectrum is divided into six broad region : violet, blue, green, yellow, orange and red which are formed by passing white light through the optical prism as shown below[1].



3. Detection skin pixel region

In the proposed method in this paper, the goal is to detect the presence of faces in an PDF using skin color model based on sample chrominance values, skin likelihood, Segmentation, Morphological operation and Label matching algorithm to detect faces uniform and non uniform background color of the scene.

Gaussian model:

The skin color distribution can be represented by a Gaussian model N(m, C) [1] With this Gaussian fitted skin color model. Now obtain the likelihood of skin for any pixel of an image. Therefore, if a pixel, having transformed from RGB color space to chromatic color space has a chromatic pair value of (r, b), the likelihood of skin for this pixel can then be computed

Segmentation of skin region

Segmentation is a process that partitions an image into regions. There are different segmentation methods; segmentation based on color is considered. Precise segmentation of the input image is the most important step that contributes to the efficient detection and localization of multiple faces in skin tone color images and Segmentation of an image based on human skin chromaticity using different color samples for adaptive thresholding.

Disk and dilation operations

Morphological erosion is applied by using structuring element of particular disk size. The dilation is applied to regrow the binary skin areas which are lost due to aggressive erosion step. The dilated binary image is multiplied with binary image from segmentation process to maintain the holes as shown. The next stage to analyze the region to determine it is a face region or non skin regions and regions is labeling.

3. YCbCr Colorspace for recognition of skin pattern

This is the color space that defined to meet the increasing demand of digital algorithm principles in handling video information and has become the vastly used color space in digitally created videos. This has three components; two of them are chrominance and luminance. The model available in the family of television transmission of color space with YUC and YIQ . The YUC, YIQ are designed for analog space for PAL and NTSC systems. YCrCb color model is developed in order to transmit color data onto the television sets keeping intact the concept of existing black and white television sets. These display the images in grey and has the characteristic of isolating luminance and color information, thus used in compression which is one of the such application [6][2].

To increase performance of skin color clustering, we use YCbCr space to build a skin color model, as the chrominance components are almost free from the luminance component in the space, there is non-linear relations between chrominance (Cb,Cr) and luminance(Y) of skin color in the high and low luminance region areas. In the RGB space, the triple component (r,g,b) represents not only color but also luminance value. Luminance may vary across a

person's face due to the change in lighting and is not a dependable measure in separating skin region from non-skin region space [2]. YCrCb is an encoded nonlinear RGB signal, commonly used in European television studios for image compression work. Color is represented by luma (which is luminance, computed from nonlinear RGB), constructed as a weighted sum of the RGB values, and difference of two color values such as Cr and Cb that are found by subtracting luma from RGB red and blue components from each other. The key factor is its transformation simplicity and explicit separation of luminance and chrominance components makes this color space attractive for skin color modeling for various images [3]. In YCbCr color space, the two chroma components Cr, and Cb can be efficiently used to define explicitly skin region over the various images. The thresholds be chosen as (Crmax;Crmin) and (Cbmax;Cbmin) , a pixel is differentiated as skin pixel if the values (Cr,Cb) fall within the thresholds values. Luminance needs to be removed from the color representation in the chromatic color space over a image. Chromatic colors, also called as "pure" colors when luminance is absent [3][9].

The conversion of RGB color to YCbCr can be performed using matrix shown below.

$$\begin{bmatrix} Y \\ Cb \\ Cr \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 0.148 & -0.291 & 0.439 \\ 0.439 & -0.368 & -0.071 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix} + \begin{bmatrix} 16 \\ 128 \\ 128 \end{bmatrix}$$

The value for skin pixel using YCbCr is given by red chrominance is in between (148, 169) , blue chrominance is in between (142, 197) and hue in between (0.01, 0.1).

5. Results and Discussion

The window called image data displays the extracted images from particular test PDF document.

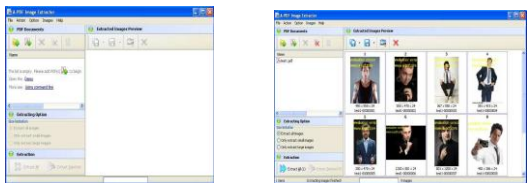


Fig: PDF Extractor tool

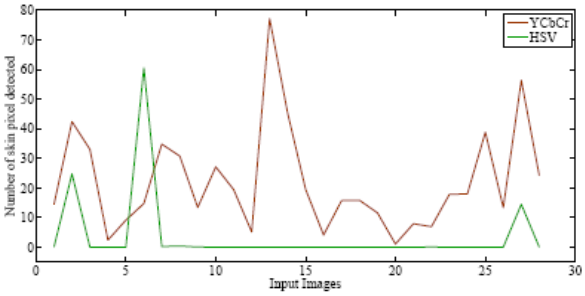


Fig: Comparison of YCbCr with HSV

As it can be observed from the above analysis graph which compares the two techniques over the various test images. The detection ratio for skin pixel is high for YCbCr. There are situations which may give high value for the HSV and it is because of the wrong image conditions. The test is carried over the several images with different background, image condition, and noisy images. In most of the cases the technique used in present paper for detecting the skin pattern found better.

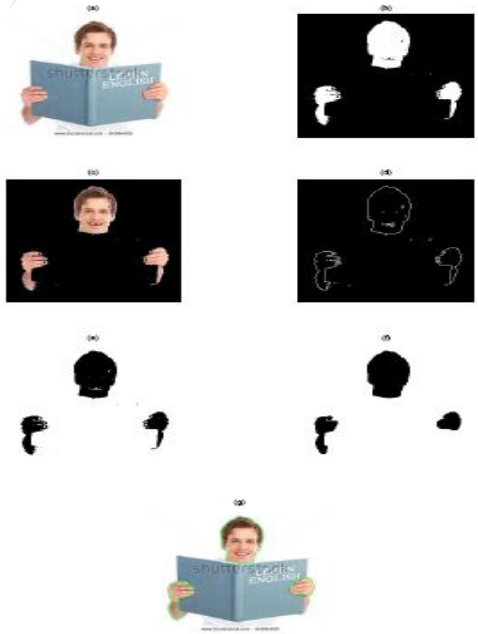


Fig: (a). Input image, (b). Segmented image, (c). Color segmented image, (d).Edge detected image, (e). Image after binarilization, (f). Image after morphological operation, (g). Skin region detected image

Finding Skin region using YCbCr technique. This technique differentiate the skin pixel and non skin

pixel. However this information provide necessary information to extract the skin region in image with some background. Observation of result indicate that there is region shown by green area, locating the skin blocks present in an image. The procedure works well with most of the image with complex background and variant illumination condition.

6. Conclusion

The paper discusses skin pattern detection in portable document format(PDF). The images are extracted from PDF, using PDF image extractor tool. The skin region extracted using YCbCr techniques, since it has very good detection rate for skin pixel. The skin region extracted, are labeled. Now, each label is consisting of skin pixel. The label with maximum number of skin pixels is considered as the skin pattern present on image. The skin pattern detection ratio for such method proves to be very large in present work.

From the work carried out on this paper, it is concluded that it is very difficult and still a challenging task to build up an automatic skin detection method that is works effectively in all situation whether the image consists of different background, bad image condition or image affected by illumination. But there exist, the different skin pattern detection methods to overcome different problems of ski region detection. There are methods or techniques shows good result for particular problem or application and others shows good result for different application. The present work emphasises on the efficient way of achieving the skin region compared to other available techniques.

7. References

[1] Tarek Abd El-Hafeez. A new system for extracting and detecting skin color regions from pdf documents. *International Journal on Computer Science and Engineering(IJCSE)*, 2(9):2838–2846, 2010.

[2] D N Chandrappa, M Ravishankar, and D R RameshBabu. Automated detection and recognition of face in a crowded scene. *International Journal of Computer and Network Security*, 2(6):65–70, June 2010.

[3] D N Chandrappa, M Ravishankar, and D R RameshBabu. Face detection in color images using skin color model algorithm based on skin color information. *IEEE*, pages 254–258, 2010.

[4] E Angelopoulou. Understanding the color of human skin. *In Proc. SPIE Conf. On Human Vision and Electronic Imaging VI (SPIE)*, 4299:243–251, 2001.

[5] J Brand, S Mason, M Roach, and M Pawlewski. Enhancing face detection in colour images using a skin probability map. *Int. Conf. on Intelligent Multimedia, Video and Speech Processing*, pages 344–347, 2001.

[6] Cynthia A Brewer. Color use guidelines for data representation. *Alexandria: American Statistical Association*, pages 55– 56, 1999.

[7] B Hajar, E Sanaa, J Abdelilah, and A Driss. Recognition of adult video by combining skin detection features with motion information. *IEEE*, 2010.

[8] Jiang Qiang-rong and Li Hua-lan. Robust human face detection in complicated color images. *IEEE Trans*, 2010.

[9] S Sanjay, D S Chauhan, V Mayank, and S Richa. A robust skin color based face detection algorithm. *Tamkang Journal of Science and Engineering*, 6(4):227–234, 2003.

[10] Randazzo Vincenzo and Usai Lisa. An improvement of adaboost for face-detection with motion and color information. *IEEE 14th International Conference on Image Analysis and Processing (ICIAP)*, 2007.

[11] M R Tabassum, A U Gias, M M Kamal, H M Muctadir, M Ibrahim, A K Shakir, A Imran, S Islam, M G Rabbani, S M Khaled, M S Islam, and Z Begum. Comparative study of statistical skin detection algorithms for sub-continental human images. *Institute of Information Technology, University of Dhaka*, pages 1–8.