IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 6, June 2016

Enhancement of YCbCr Algorithm for Skin Color Segmentation

Sumandeep Kaur[1], Kuldeep Singh[2]

Student of Computer Science Department, Guru Kashi University, Talwandi Sabo, India[1]

Student of Computer Science Department, Chaudhary Devi Lal University, Sirsa, India[2]

Abstract: Skin color segmentation is a promising research field in computer vision. It's 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 discarded.

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

I. INTRODUCTION

Skin modeling is used to model the distribution of skin & non skin color pixels. Mainly there are two different approaches are used for skin modeling. Non-parametric methods include normalized lookup table byes classifier are histogram based approach where they estimate the skin color distribution from training data without deriving an explicit model of the skin color.

Color space is the main part of skin color segmentation to choose the suitable color space. Red, Green and Blue are most common color space used to represent the image. There are three models of color space.RGB (Red, Green, and Blue) color space model, YCbCr color space model, CIELab color space model. But we main work on YCbCr color model.

The traditional YCbCrmodel have some problem when that work on any image. In earlier system, YCbCr algorithm was designed for skin color segmentation in which skin color portion and non skin color portions were differentiate by tracing a group of pixel of an image. Askinthresholdto segment people within the image was used for a particular color complexion and no filtering of noise removal and morphological operations were applied. In earlier system, YCbCrprovides a better performance when Y is greater than 80 threshold values, Cb value lies between 85 to 135 and Cr value lies in 135 to 180.

However to find human skin from different races the thresholds given above works only with a Caucasian people skin because the first threshold only finds people with white skin and the second threshold segments people of different places of the world but some pixels are detected as skin but really not. This is the reason propose a new skin threshold to segment people.

II. LITERATURE REVIEW

The Author has been introduceImage segmentation has been and is likely to be important component of content based image acquisition and retrieval system. In this paper we have proposed an image segmentation technique that uses self-origination map (SOM) neural network for segmentation of color image. It has been observed that, SOM training if performed on the wavelet transformed image, not only reduces the training time of the SOM but also make more compact mentation. Our experiments have shown better results produced by our proposed technique then the previous approaches in practice. The self-organizing map (SOM) neural network is a type of unsupervised ANN. It has two major characteristics (1) it reduces the dimensions of data (2) it groups similar sample. These two characteristic of SOM help us in segmenting the region of the image that has similar features, and it reduces the number of color required to represent an image.[1]

Author has been explained 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]

The color image segmentation approach and applying corresponding genetic algorithm under human vision limitation and capabilities. Most of the color image

segmentation techniques initially use any clustering technique to segment color image and then genetic algorithm (GA) is used only as optimization tool. Image are directly applied on 4D-color image histogram table using JND threshold. This proposed algorithm is applied on Berkeley segmentation database in addition to general image. The segmentation performance of the proposed algorithms is estimate using probabilistic rand Index (PRI). The modified algorithm is proposed to improve the result and then compared with the proposed algorithm.[2]

The Author has been introduce a 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 accurate hand segmentation is a challenging task in computer vision applications. It introduces a new method to segment hand based on free form skin color model. The pixel value of a person's hand is captured and represented in YCbCr color model. The CbCr color space is mapped to a CbCr plane in order to produce a clustered region of skin color. Then, instead of using ellipse to model the skin color, edge detection is performed on the clustered region to construct a free form skin color model.

Proposed method consists of four modules namely Image acquisition, boundary creation, mapping and morphology. Proposed method selected YCbCr color model due the following reasons: The YCbCr has the same structure theory with person's vision. Secondly the transformation between RGB color space and YCbCr is linear. Therefore the computation Process is simple. It also has better clustering characteristic than other color mode. YCbCr color model is widely used in television and other vision devices. YCbCr under various illumination conditions has a tiny overlap between skin color and non kin color and RGB color space is very sensitive to intensity difference. Comparing to other algorithms in the domain of skin color modeling by using YCbCr color space, the performance of proposed algorithm is better because it does not approximate the boundary nor it fixes with boundary lines. But proposed algorithm does not show that skin colors of individuals cluster differently in the color space. [3]

III. PROBLEMS WITH PREVIOUS ALGORITHM

1. In earlier system, YCbCr algorithm was designed for skin color segmentation in which skin color portion and non skin color portions were differentiate by tracing a group of pixel of an image.
2. A skin threshold to segment people within the image was used for a particular color complexion.
3. No filtering of noise removal and morphological operations were applied.

IV.OBJECTIVE AND FEATURES IN PROPOSED ALGORITHM

1. TO enhance the YCbCrcolor model algorithms for skin color segmentation.
2. TO analyse the results of segmentation of YCbCrcolor model algorithm.
3. YCbCr algorithm are enhancement for skin color segmentation in which skin color portion and non skin color portions are differentiate by tracing each individual pixel rather than by dividing some area portion of an image at each step. So excellent skin color segmentation is obtain in which segment the every skin color whether it is blackish, yellowish, brownish and whitish and also gives good results under different light conditioning because in contrast to RGB, the YCbCr color space is lumain dependent. So provides a better performance.
4. Anewskinthresholdto segment people within the image regardless skin color, so the optimal range threshold for Cb lies 76 to 126 and for Cr lies 132 to 173 where
   $Y = 0.299R+0.587G+0.114B$, $Cr = R-Y$, $Cb = B-Y$
   Y in YCbCr denotes the luminance component and Cb and Cr represent the chrominance component
5. Filtering such as noise removal and morphological operations is also applied in these algorithms. So it will give efficient result during segmentation.

V. RESEARCH METHODOLOGY

This section has been explained the steps which have been followed for skin color segmentation with new YCbCr model.

A. Purpose New YCbCr Algorithm.

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 gray world 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.

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 6, June 2016

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 picks 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.

A data flow diagram is a tool for the system analyst that gives the pictorial representation of overall system

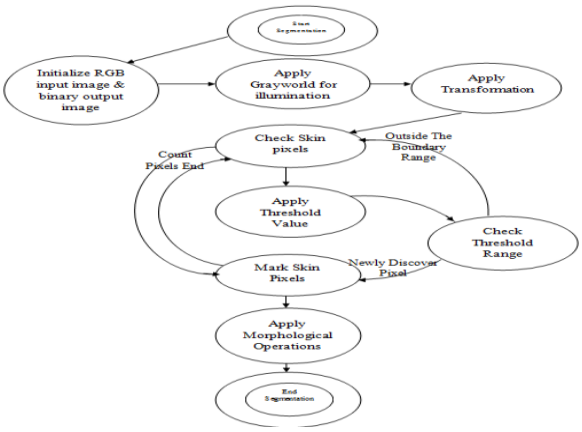

Fig.1 Flow Chart of Proposed New Algorithm Skin Color Segmentation

VI. RESULT

We show the result throw the MATLAB window. In order to test the effectiveness, we implemented the proposed algorithms in MATLAB 7.10.0**.**

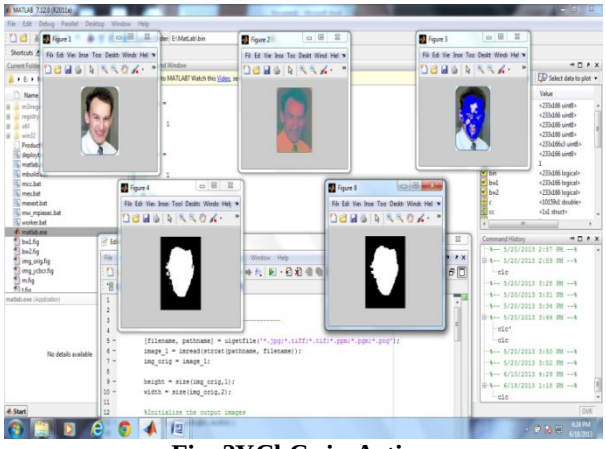

Fig. 2YCbCr in Action

At this point YCbCr in action and the RGB image is segmented which shown below.

RGB Image

YCbCr Image

Mark Skin Pixel

After Skin Color Segmentation

After Noise Removal and Morphological Process

Fig. 3YCbCr Result Images

These images are also shown as output snapshot of step by step workin of YCbCr algorithm. Figure 4.11 is the original RGB image. Next image is the YCbCr image which is further segmented and filter operations are applied at last step. So the last image is the segmented image which is noise free image.

Results show a type of behavior in skin color segmentation, from which some conclusions can be draw:

- The black color in the figures represents the non skin regions while others are the segmented possible face regions. The result of skin like region detection using the YCbCrcolor space works well over those regions under strong lighting.
- When proposed compensation scheme is applied, it can detect most of the skin regions by a single skin color map irrespective of the lighting conditions. Furthermore, the possible regions to be examined by the face detector can be reduced after the possible skin regions are extracted. As a result the runtime required for face detection can be reduced.

- When skin color segmentation with YCbCr color space is applied, background color should also be chosen in right manner because from the above result of skin color it observes that if background color match with person hand or human skin color then segmentation will not be in good manner.

So from the analysis of result it concludes that the skin color segmentation is helpful in facial recognition system in which a computer application automatically identifying a person from a digital image**.**

VII. CONCLUSION AND FUTURE SCOPE

In present research work YCbCr and CIELab algorithms are design for skin color segmentation which has proven to be a useful and sturdy cue for face detection, localization and tracking, hand detection etc. This dissertation also describes the overall analysis of YCbCr and CIELab color space. From the result of skin color segmentation with YCbCr and CIELab it's come on theconclusion thatCIELab gives more information when the skin color segmentation done with CIELab color space as compare to YCbCr color space. When the skin color segmentation with CIELab color space is done, background should also take care of because from the above result of skin color segmentation with CIELab color space it observe that if background color match with human hand then segmentation will not be in good manner.When proposed compensation scheme is applied, it can detect most of the skin regions by a single skin color map irrespective of the lighting conditions. Furthermore, the possible regions to be examined by the face detector can be reduced after the possible skin regions are extracted. As a result the runtime required for face detection can be reduced. Fast segmentation is also shows with CIELab color model because the CIELab color space is an absolute color space, it defines colors exactly. It does not depend on input devices (camera) or output devices (monitors and printer). CIELab includes more color (even more than the human eye can see) than other color space. So from the analysis of result it concludes that the skin color segmentation is helpful in facial recognition system in which a computer application automatically identifying a person from a digital image. It is typically use in security systems and can be compared to other biometrics such as fingerprint systems. After performing these segmentation methods it's conclude that CIELab is good for skin color segmentation.

VIII. FUTURE WORK

Skin color segmentation is helpful in vision gesture recognition, human computer interaction, face detection, localization and tracking. After the skin color segmentation, feature extraction can be done which will be helpful to make gesture for human computer interaction. The proposed algorithm for this dissertation detects only human faces in an image. After detecting human faces in images, there should be some extra features detection in future work such as eyes, a nose and mouth detections in faces.

Another possible direction for future work by using the feature extraction which is centroid of hand and fingertips, perform many action such as left movement and right movement of mouse.

Also make gesture based on distance calculation of centroid and index fingertip which can recognize how many fingers are on the left hand and right hand side of middle finger.

REFERENCES

[1] M.Y.Farooque, S.Raeen."Self-organizing map based improved color image segmentation" International journal of advanced research in computer science and software engineering volume 6(3), march 2016 ISSN: 2277128X.

[2] M.Sahu, K.M.Bhurchandi," color image segmentation using genetic algorithm". International journal of computer applications(0975-8887) volume 140-no5,april 2016.

[3] Yihu Yi, DaokuiQu and Fang Xu ," Face detection method based on skin color segmentation and eyes verification", International Conference on Artificial Intelligence and Computational Intelligence,pages 495-501,2009.

[4] Yihu Yi, DaokuiQuand ,FangXu," Face detection method based on skin color segmentation and facial component localization", 2nd International Asia Conference on Informatics in Control, Automation and Robotics,pages 64-67,2010.

[5] Ahmad YahyaDawod, Junaidi Abdullah and Md.JahangirAlam, "A New Method for Hand Segmentation Using Free-Form Skin Color Model", 3rd International Conference on Advanced Computer Theory and Engineering(ICACTE) , Pages 562-566,2010.

[6] Minghua ZHAO YonggangZHAO,"Skin color segmentation based on improved 2D Otsu and YCgCr" International Conference on Electrical and Control Engineering, pages 1954-1957,2010.

[7] Byeongcheol Choi, Seungwan Han, and Byungho Chung, JaecheolRyou,"Human Body Parts Candidate Segmentation usingLaws Texture Energy Measures with Skin Color", pages 556-560,ICACT 2011.

[8] Noha A.Hikal1 AND RoumenKountchev," Skin Color Segmentation Using Adaptive PCA

[9] And Modified Elliptic Boundary Model",PAGES 407-412, ICACSIS 2011.

[10] Mohammad SaberIraji AND Ali Yavari," Skin Color Segmentation in Fuzzy YCBCR Color Space with the Mamdani Inference", American Journal of Scientific Research July (2011), pp.131-137.

[11] Kwok-Wai Wong, Kin-Man Lam And Wan-Chi Siu , " An Efficient Color Compensation Scheme For Skin Color Segmentation" ,Pages 676-679,2003.

[12] Crowley, J. L. and Coutaz, J., "Vision for Man Machine Interaction," Robotics and Autonomous Systems, Vol. 19, pp. 347-358 (1997).

[13] Cahi, D. and Ngan, K. N., "Face Segmentation Using Skin-Color Map in Videophone Applications," IEEE Transaction on Circuit and Systems for Video Technology, Vol. 9, pp. 551-564 (1999).