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Novel approach to Adaptive Extraction of Standing Human Contour from Image

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ABSTRACT: *Extraction of standing Human contour from image is challenging task that can facilitate numerous applications, like activity recognition, robot navigation. In this paper the approach to Extract standing Human Contour from Image is proposed. In this work we perform Face detection([5],[6]), than skin detection two color baseclassification usedto get optimized result, thanUpper Body Estimation and Lower Body Estimation is perform , followed by Upper Body Extraction and Lower Body Extraction, Than OR both Extraction to get human contour*
Keywords: *FaceDetection, Skin Detection, Upper Body Estimation, LowerBody Estimation, UpperBody Extraction,Lower Body Extraction, Human contour.*

I. INTRODUCTION

EXTRACTION of the human body in unconstrained still images is challenging due to several factors, including shading, image noise, occlusions,background clutter, the high degree of human body deformability, and the unrestricted positions due to in and out of the image plane rotations. Knowledge about the human body region can benefit various tasks, such as determination of the human layout ([10],[3]), recognition of actions from static images , and sign language recognition, Interfacing with TV,RoboticNavigation,Automatic cars - Pedestrain detection.

Human body segmentation and silhouette extraction have been a common practice when videos are available in controlled environments, where background information is available, and motion can aid the segmentation through background subtraction. In static images, however, there are no such cues, and the problem of silhouette extraction is much more challenging,especially when we are considering complex cases.

In this paper, The proposed approach for Extraction of Standinghuman contour from image.The problem decompose into following sequential problems: Face detection using Viola Jones ([5],[6]), skin detection by using two color based classification i.e 2DHistogram and Gaussian Mixture Model(GMM) ,than Fused the result of both ,2DHistogram and GMM, than fusion result applied in color image and new image named as color fused image is generated , than upper body estimation, and lower body estimation, since there is a direct pairwise correlation among them. Face detection provides a strong indication about the presence of humans in an image, greatly reduces the search space for the upper body, and provides information about skin color. Face dimensions also aid in determining the dimensions of the rest of the body. This information guides the search for the upper body, which in turns leads the search for the lower body. Moreover, upper body extraction provides additional information about the position of the hands, the detection of which is very important for several applications,The upper body extraction and lower body extraction is Or to get human body contour.

II. LITERATURE SURVEY

The position, dimensions, and color of the face are used for the localization of the human body, construction of the models for the upper and lower body according to anthropometric constraints, and estimation of the skin color. Different levels of segmentation granularity are combined to extract the pose with highest potential. The segments that belong to the human body arise through the joint estimation of the foreground and background during the body part search phases, which alleviates the need for exact shape matching Qualitative and quantitative experimental results demonstrate that this methodology outperforms state-of-the-art interactive and hybrid top-down/bottom-up approaches [1].

KNN classifier algorithms is used to find face and emotion of the person. KNN classifier algorithm gives the emotion of the person whose features are matched from the database. For detecting the face from the image the well known Viola Jones face detection method and for detecting voice features we used Mel frequency components of the human voice. [2].

A colorspace transformation is assumed to increase separability between skin and non-skin classes, to increase similarity among different skin tones, and to bring a robust performance, without any sound reasoning. Surprising results indicate that most of the colorspace transformations do not bring the benefits. The observations from four metrics in 2D and3D were not identical. However, in four out of eight observations, none of colorspace transformations was better than the RGB[3].

The simple RGB color space combined with YCgCb color space detection first, then use the texture information detect skin areas. Experimental results show that this method can remove a large number of non-skin color under the complex background, which enhanced the resolution between skin color and non-skin color. The results still have some mistakes for the false judgment which was caused by the interference under the complex background in the process of skin detection, the further work is to improve the resolution by finding a better way on the basis of this method.[4].

The starts is with the introduction to human face detection and tracking, followed by apprehension of the Viola Jones algorithm . Viola jones algorithm was based on object detection by extracting some specific features from the image. The same approach for real time human face detection and tracking. Simulation results of this developed algorithm shows the Real time human face[5].

A human face detection scheme by combining a novel hybrid color models and Viola-Jones face detector presented. A hybrid skin color model RGB-CbCrCg was proposed for classifying skin and non-skin pixels. The extraction of skin region is carried out using a set of bounding rules optimized employing multi-objective differential evolution method. Afterward the segmented face regions are identified using Viola-Jones algorithm built in MATLAB Computer Vision System Toolbox™.[6]

The primary goal of this work is to recognize actions from still images. In still images, the information about the action label of an image mainly comes from the pose, i.e. the configuration of body parts, of the person in the image. However, not all body parts are equally important for differentiating various actions. The configurations of torso, head and legs are quite similar for both walking and playing golf.[7]

This paper describe a method comprising color constancy based skin detection and Local-Global (LG) graph matching in color images to address these challenges. [8]

A simple model for parsing pedestrians based on shape is been described. This model assembles candidate parts from an over segmentation of the image and matches them to a library of exemplars. Simple constraints enforce consistent layout of parts. Because this model is shape based, it generalizes well. the use exemplars from a controlled dataset of poses but achieve good test performance on unconstrained images of pedestrians in street scenes. The model is closely related to the AND/OR graph framework of which was used to parse human body poses in[9]

It proposed a generic model for detection and articulated pose estimation. The model is evaluate on three related tasks of increasing complexity: Pedestrian detection, upper body pose estimation, and multi-view full body pose estimation.[10].

III. PROPOSED WORK

Fig.1 The Architecture of Proposed system is shown below.

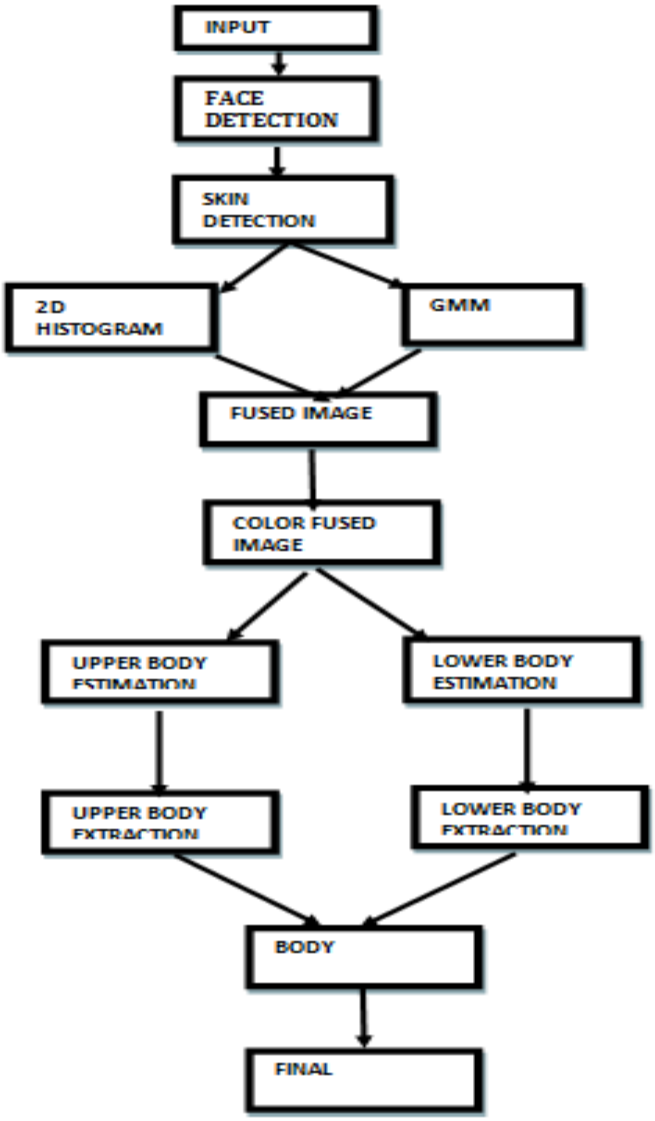

Fig. 1. Architecture Of Proposed System

- Input image: The single still image from which to extract the standing human body is taken as an input.
- Face Detection: For the face detection from the given input image Viola Jones algorithm is used.
- Skin Detection: For the skin detection color based classification 2DHistogram and Gaussian Mixture Model is used for skin detection.
- Fused Image: The output of 2DHistogram and Gaussian Mixture Model is Fused to get Optimize result .
- NoiseRemoved: Erode, Dilate, Smoothing, Thresholding is performed on Fused image to remove the noise from fused image.
- Color Fused Image: Fusion result is applied in color image and is get color Fused Image.
- Upper Body Estimation: In this the upper body is estimated
- Lower Body Estimation: In this the lower body is estimated
- Upper Body Extraction: In this upper body is extracted
- Lower Body Extraction: In this lower body is extracted
- Body Fused: In this extracted upper body and lower body Fused respectively
- Final Result: The standing human body contour from the image is obtained

IV. FACE DETECTION

Viola Jones Face detection algorithm is used to detect the face from the standing human body image.Viola Jones Face detection algorithm

- Haar Features
- Integral Image
- Adaboost
- Cascading

A face detection algorithm is a system designed giving some input faces and non faces and training a classifier to identify as a same and once the training is done the data that is obtained is used to identify the face.

V. SKIN DETECTION

A conclusion section must be included and should indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extentions.

For the skin detection color based classification 2DHistogram and Gaussian Mixture Model is used for skin detection. The output of 2DHistogram and Gaussian Mixture Model is Fused . That provides optimized result

A. 2DHistogram

Histogram is a graph /plot gives idea about intensity distribution of an image.Graph/plot is with pixels values on X-axis (not always) and corresponding number of pixels in the image on Y-axis. By looking at Histogram intuition about contract, brightness, intensity distribution etc of that image is obtained.

B. Gaussian Mixture Model

A Gaussian Mixture Model (GMM) is a parametric probability density function represented as a weighted sum of Gaussian component densities. GMMs are commonly used as a parametric model of the probability distribution of continuous measurements or features in a biometric system, such as vocal-tract related spectral features in a speaker recognition system. GMM parameters are estimated from training data using the iterative Expectation-Maximization (EM) algorithm

Fused Image

Fusion result is applied in color image and get color Fused Image.

Color Fused Image

Erode, Dilate, Smoothing, Thresholding is performed on Fused image to remove the noise from fused image.

Upper Body Estimation

In this upper body is estimated of the human from the image and mark that by rectangle . Once the face get detected by taking that reference .In upper body rectangle the x corodinateis obtained by subtracting x coordinate of face rectangle from width of face rectangle ie(rectFace.x- rectFace.width) and In upper body rectangle y corodinateis obtained by adding y coordinate of face rectangle to height of face rectangle and multiplying it by 1.4 ie(rectFace.y + rectFace.height * 1.4) and to get the height of upper body rectangle the height of face rectangle * 6 and to get width of upper body rectangle the width of face rectangle * 3

```
rectUB = newRectangle();
rectUB.X = (int)(rectFace.X - rectFace.Width);
rectUB.Y = (int)(rectFace.Y + rectFace.Height * 1.4);
rectUB.Height = (int)(rectFace.Height * 6);
rectUB.Width = (int)(rectFace.Width * 3);
```

VI. LOWER BODY ESTIMATION

In this we estimate the lower body from the image and mark that by rectangle. Taking the upper body rectangle as a reference the x coordinate of lower body rectangle is same as x coordinate of upper body rectangle and y coordinate is y coordinate of upper body + height of rectangle of upper body and height and width of lower body rectangle is same as upper body rectangle.

```
rectLB = new Rectangle();
rectLB.X = rectUB.X;
rectLB.Y = (int)(rectUB.Y + rectUB.Height);
```

```
rectLB.Height = (int)(rectUB.Height);
rectLB.Width = (int)(rectUB.Width);
```

Upper Body Extraction

In this the upper body is extracted by using The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images.and once the Upper Body edges are detected the flood fill is use to fill the edges that are detected by Canny edge detector with white color

Lower Body Extraction

In this the Lower body is extracted by using The **Canny edge detector** is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images.and once the Lower Body edges are detected the flood fill is use to fill the edges that are detected by Canny edge detectorwith white color

BODY FUSED

In this extracted upper and lower body is fused to get the full body contour

FINAL RESULT

In this Extraction of Standing Human Contour from Image is obainedsuccessfully . The Body Fused that is obtained has white color human contour. Each pixel of the Full body contour is replace with the actual color that is present in input image.And standing Human contour from image is obtained With background subtraction

VII. RESULTS ANALYSIS

A. Face Detection Algorithm Analysis

Table I: Analysis of face Detection Algorithm

Method	TYPE	TYPE
Face detection	Frontal face	Side face
	90-95%	80-90%

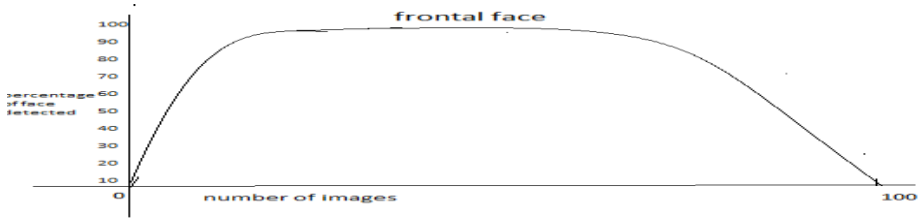

Fig. 2. Graph of side face

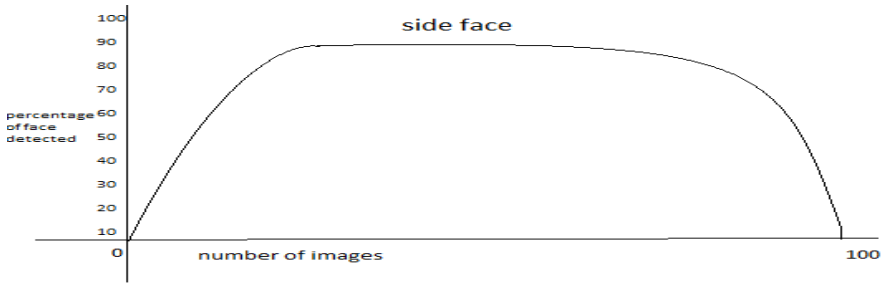

Fig. 3. Graph of Frontal face

B. Analysis of Skin Detection: GMM and 2D-Histogram

Table II: Analysis of face Detection Algorithm

Method	Method1	Method2
Skin Detction	2D-Histogram	GMM
	80-90%	90-100%

*GMM

- 2D-Histogram

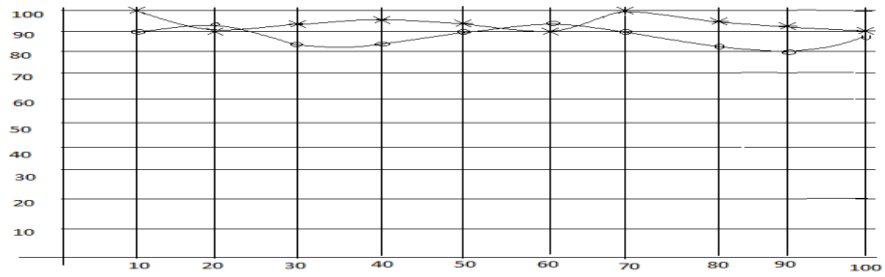

Fig. 4. Graph of Skin detection using GMM and 2Distogram

VIII. EXPERIMENTAL RESULTS

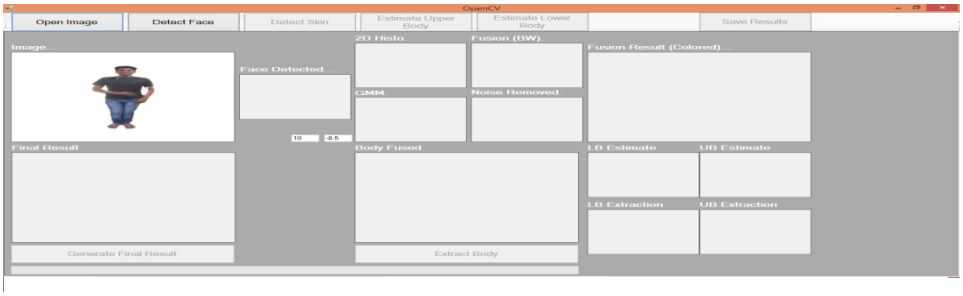

Fig. 5. Input image

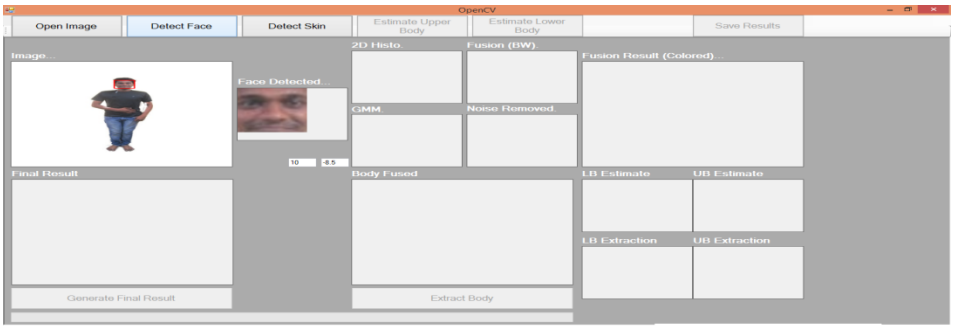

Fig. 6. Face Detection

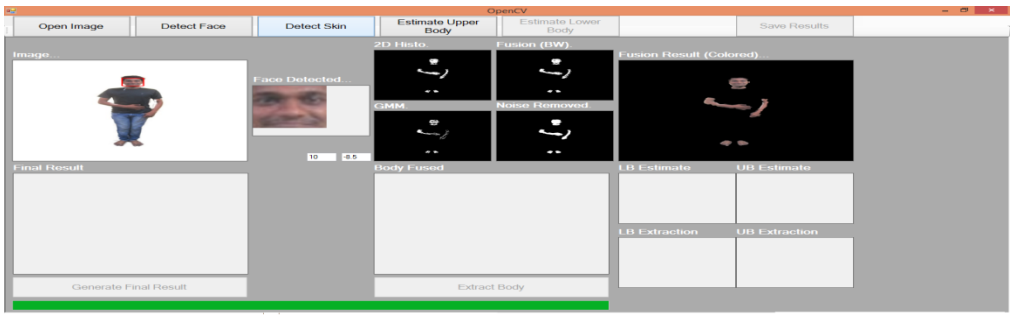

Fig. 7 . Skin Detection

Fig. 8. Upper Body Estimated

Fig. 9. Lower Body Estimated

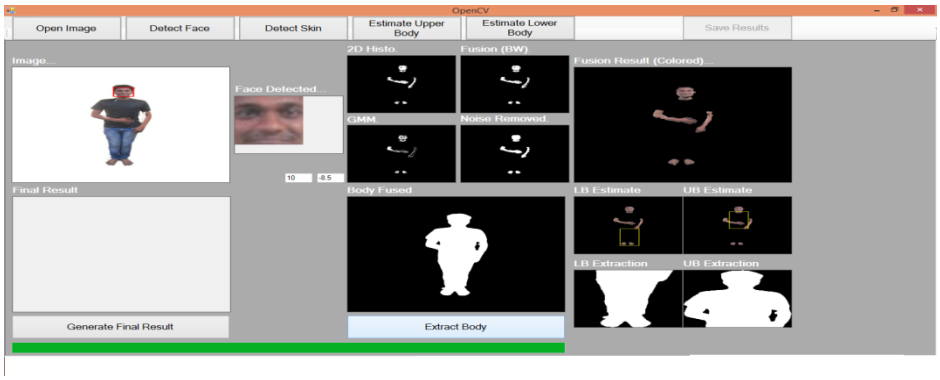

Fig. 10. Upper Body Extracted and Lower Body Extracted and obtained body contour

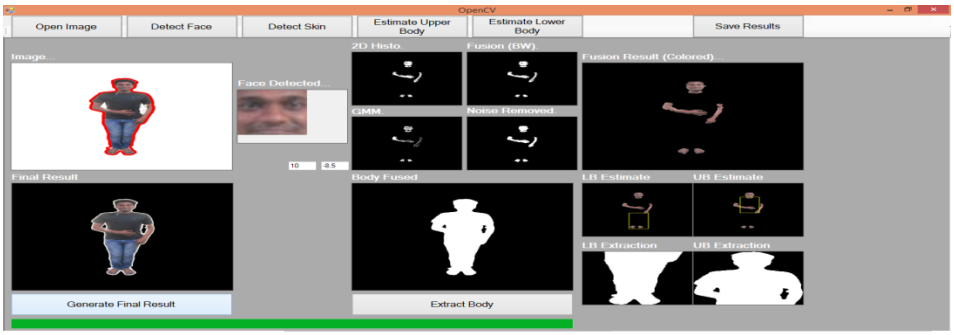

Fig. 11. Human body contour Extracted from Image

IX. CONCLUSION

Thus , Extraction of Standing Human Contour from Image is successfully perform. For Face detection Viola Jones algorithm is used , Skin detection is performed by using two algorithm 2D-Histogram and Gaussian Mixture Model and the result of both is combined to obtained optimized result, and then Upper Body Estimation and Lower Body Estimation is perform, then Upper Body Extraction and Lower Body Extraction is perform, then both Extraction results obtained are fused and finally Human body contour Extracted from Image

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