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# Human Skin Detection from Image using Gaussian Algorithm

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**Abstract-**This paper presents the procedures of Human skin detection. For this we propose preprocessing (RGB mean value) that combines a smoothed 2-D histogram [4] and GAUSSIAN approach, for automatic human skin detection in color images. The main objective of this paper is to provide the maximum prefect area of human skin to be detected. The experimental result has show that the performance of the Gaussian approach works well over the Human skin detection, eye detector.

**Keywords**: Skin detection; 2 d histogram; Gaussian model; preprocessing RGB mean value; adaptive threshold segmentation

## I. INTRODUCTION

Skin detection is the process of Finding skin-colored pixels and regions in an image [1]. This process is typically used as a preprocessing step to find the regions that potentially have human images. By detecting skin-colored regions was used to identify nude pictures on the internet for the sake of content filtering [2]. Several computer vision approaches have been developed for skin detection. A skin detector typically transforms a given pixel into an appropriate color space and then uses a skin categorizer to identify the pixel whether it is a skin or a non-skin pixel.

## II. REVIEW OF LITERATURE

The basic concept of the image processing and the skin detection are covered in the review of literature. Also in the previous research they already made the skin detection using MATLAB [1], fusion approach etc. But in this paper, we are implemented the Gaussian Algorithm.

Table: 1-Here is a table to describe the Literature survey for this skin detection.

| S.NO | TITLE | AUTHOR | WORKING |
|---|---|---|---|
| 1 | Algorithm Fusion for Face Localization | M. MILGRAM | It presents the fusion task application using detectors like skin color, auto associative multi layer perception and ellipse Hough transform. |
| 2 | Fusion of multicolor space for human skin region segmentation | Fan Hai Xiang, Shahrel Azmin Suandi | Identifies the skin color segmentation based on color space models. |
| 3 | Next level of data fusion for human face recognition | M. K. Bhowmika, G. Majumdera, D. Bhattacharjeeb, D. K. Basub, M. Nasipurib | Recognize human face by low level fusion namely data fusion and high level fusion namely decision fusion.<br>1.Data fusion using wavelet decomposition and reconstruction techniques.<br>2.Decision fusion based on Bayesian formulation |
| 4 | Skin detection and segmentation of human face in color images | Baozhu Wang1∗, Xiuying Chang2∗, Cuixiang Liu1 | Identifies face segmentation in image by skin detection process, through establishment of skin model and segmentation of skin region. |
| 5 | A MATLAB based face recognition system using image processing and neural networks. | Jawad Nagi, Syed Khaleel Ahmed and Farrukh Nagi | It is a image based approach, using artificial intelligence by removing redundant data from face through image compressing using 2D-DCT. |
| 6 | Face detection in color images | Rein-Lien Hsu, Mohamed Abdel-Mottaleb and Anil K.Jain | It uses a skin tone color model and facial feature to detect color images using face detection algorithm. |

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## III. PROBLEM WITH HUMAN SKIN DETECTION

1. A reliable human skin detection method that is adaptable to different human skin colors and illumination conditions is essential for better human skin segmentation.

2. The existing methods require high computational cost. We discuss a novel human skin detection approach that combines a smoothed 2-D histogram and Gaussian model, for automatic human skin detection in color images.

3. In our approach, an eye detector is used to refine the skin model for a specific person. The proposed approach reduces computational costs as no training is required, and it improves the accuracy of skin detection despite wide variation in ethnicity and illumination.

4. The first method to employ fusion strategy for this purpose. Qualitative and quantitative results on three standard public datasets and a comparison with state-of-the-art methods have shown the effectiveness and robustness of the proposed approach.

A. Type of problem

**Low Accuracy:** False skin detection is a common problem when there are a wide variety of skin colors across different ethnicity, complex backgrounds and high illumination in image(s).

**Luminance-invariant space:** Some robustness may be achieved via the use of luminance invariant color space, however, such an approach can withstand only changes that skin-color distribution undergoes within a narrow set of conditions and also degrades the performance.

**Require large training sample:** In order to define threshold value(s) for detecting human skin, most of the state-of-the-art work requires a training stage. One must understand that there are tradeoffs between the size of the training set and classifier performance.

## IV. METHODOLOGY

Firstly we will upload an image into the software and then we have to get the statistic of an image by the use of preprocessing (RGB mean value) the selected image. After getting the mean value, we can it for detecting the human skin image. The 2D histogram and Gaussian approach is implemented for detecting the human skin.

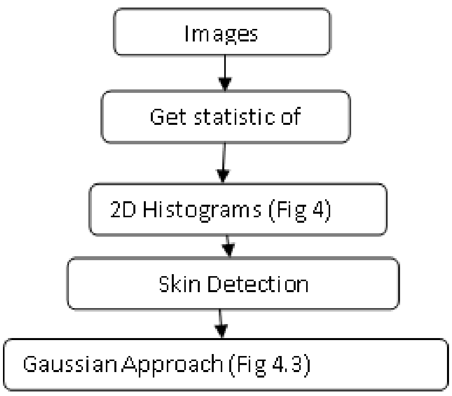


Fig 1: System flow

**A.** .**2D** Histograms

In image detection process a 2D histogram shows the relationship of intensities at the exact position between two images. The 2D histogram [4] is commonly used to compare two channels in a multi-channel images, where the x-axis represent the intensities of the first channel and the y-axis the intensities of the second channel. As a comparison, a 1D histogram is nothing more than counting how many voxels with a particular intensity occur in the image. The intensity range of the image is divided in bins. A voxel then belongs to the bin if its intensity is included within the range the bin represents. The 2D histogram is the same as the 1D histogram with the difference that it counts the occurrence of combinations of intensities. To compute a 2D histogram the images need to be equal in size.

B. Gaussian Approach

This is a two-dimensional version of the Gaussian function[5]. All that really matters here is the general image. It peaks in the centre and decays as you move away. You can control how quickly it decays by varying the *σ* parameter.

A Gaussian function is a function of the form:

$$f(x) = a \exp\left(-\frac{(x-b)^2}{2c^2}\right) + d$$

For arbitrary real constants *a*, *b*, *c*, *d*.

The graph of a Gaussian is a characteristic symmetric "bell curve" shape that quickly falls off towards zero. The parameter *a* is the height of the curve's peak, *b* is the position of the center of the peak, and *c* controls the width of the "bell".Gaussian functions are widely used in statistics where they describe the normal distributions, in signal processing where they serve to define Gaussian filters, in image processing where two-dimensional Gaussians are used for Gaussian blurs, and in mathematics where they are used to solve heat equations and diffusion equations and to define the Weierstrass transformUsing Gaussian processes for noisy 2-dimensional Interpolation Recall the decomposition of the observations into spatial and independent components we are striving for yi = si + ni.

In order for Gaussian processes to be used efficiently we assume fnigNi=1 are Gaussian in addition to being independent, identically distributed with zero mean. We will see that the variance of ni will be estimated from the data automatically. Initially, we will also assume si = f(xi) for some unknown (latent) function of the two coordinate inputs x; hence, ni will denote the departures of yi from f(xi) and our task can be seen as determining the value of f at all data point locations, what on may call the two-dimensional noisy interpolation problem. The approach of parametric methods is to parameterize a class of functions conjectured to contain the right f and use the data to estimate its parameters. Coming up with the right parametric form is generally difficult. By contrast, Gaussian process regression discovers f without explicitly stating a parametric form but rather by vaguely specifying its expected behavior through a “distribution over functions”.

## V. RESULT AND DISCUSSION

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Giving the input by selecting the image for testing the expected result, this is implemented for the discussion.

**Step 1:**

For implementation first we have taken an original image to gather RGB mean value in the preprocessing section.

Fig 2: Original image

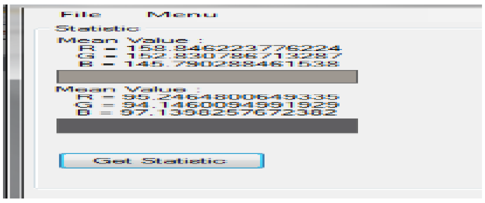


Fig 3: Mean Values(RGB)

**Step 2:**

After getting the RGB mean value, we are being proceeded the 2D Histogram for the original image.

Fig 4: 2D Histogram

Histogram (Fig 4) is the 2D Histogram image which is taken from the original image (Fig 2). In the 2D Histogram, the front image and the back image is been separated from the original image.

**Step 3:**

We can separate the Human skin successfully using Gaussian Approach (Fig 5) from the Histogram(Fig 4).

Fig 5: Human Skin Detection

## VI. CONCLUSIONS

As a conclusion this project is almost fully completed successfully. The layout which can be added by developed the 2D histogram(fig 4) of Red, Green, and Blue (RGB) colors and Gaussian approach in other to calculate the surface area of the input image and displays that values in both decimal and hexadecimal to the final result also recommended as the future work. By adding the layout, the result is become clearer and detail for the user.

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