

Color Features Based Skin Detection For Recognizing Clothing Styles of People

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Abstract : The great usage of mobiles, Internet and social media give the opportunity for the existence of trillions of images on the World Wide Web beyond our imagination. This created a substantial demand for algorithms to perform content-based image retrieval of images. Now researchers, are concentrating on the identification images likefully dressed, partly dressed or no dressed which is also become vital area of research called natural content-based retrieval problem. The skin detection is the key research in order to study the image portions for the efficient categorization. This paper uses color features based image attributes using simple histogram learning techniques. We used the Fashionista benchmark dataset v0.2 and tested with 25 random images. The results are surprisingly satisfied and achieving a considerable success rate of 85% true positives and 15% true negatives. We believe that this work will be improved further to achieve the goal. The entire work is done using Matlab 6.0.

Keywords : Skin Detection, Image Categorization, Content-based Retrieval, Image Processing.

I. INTRODUCTION

Classification based on skin color determines whether the pixel belongs to specific skin color values or not. This classification helps in overcoming difficulties such as skin tones and scene illuminations. Face detection based on skin color, this method is divided into 3 parts:

- Color-Space Decision
- Segmentation of image through Skin Model
- Segmented Image Face Localization

The ability to recognize faces by humans is remarkable and has inspired researchers of vision field to develop systems that can recognize faces the same way humans do based on 2D face images. However, the current state of the art in computer vision can recognize faces in a constrained environment only. Further, the recognition of faces can be divided into two branches (i) Face Verification and (ii) Face Identification. In Face verification, one to one matching approach is used in which an image query is matched with only one template. Whereas, in Face Identification, one to many matching approach is used in which an image query is matched with n no. of templates available in the database. The presence of high degree variability makes recognition more challenging. The current available techniques can be divided into two ways (i) Using holistic texture features that is Appearance based (ii) Using geometric features that is Geometric based. Experiments shows, appearance based

recognition results better accuracy than geometric based recognition. This is due to the fact that extracting geometrical features especially from images of low six resolutions is very difficult and also not robust. However, appearance based recognition has its own limitations if the image provided is in 3D with variations in head pose. To overcome this variations limitation in head pose, many techniques have been introduced. This paper is organized as follows. Section II gives the detailed literature survey, section III shows related work and application, Section IV depicts the future scope for research and section V concludes with a conclusion.

II. LITERATURE SURVEY

Initially, a paper [2] demonstrated an information extraction based strategy in which the system tells whether the person in the image is naked or not. The scope of the paper [1] is also explored the whole body and hand motion but limited to the work of human faces. Computer vision is the key to artificial intelligence, which has the ability to recognize humans and their activities in order to interact intelligently and effortlessly. In paper [7], authors present a concept of matching clothes detection is attempted, which is a challenging task for many blind people. In paper [6], author tries to predict human occupation based on human clothing and environment surroundings. In paper [15], authors tackle the clothing-parsing problem using a retrieval-based approach. In this approach, the model uses parsing from the pertained global clothing models available and the local clothing models learned on their datasets. In paper [14], authors discussed 'Person re-identification problem across non-overlapping camera views is a rather challenging task. Paper [11] describes a user-friendly system, which can estimate the clothes of the user and human body as well. Hence, clothing recognition has been given the high importance since long. There have been many successful attempts towards the improvement of this field. Knowledge-based or appearance-based face recognition, feature variant algorithms or template matching techniques are some of the approaches. In this paper, we shall focus on their preprocessing stages for detecting faces in color images. Before going any further there is an assumption that we should take into account, that is the problem consists of detecting the skin color regions in the image and then segmented skin region clusters are further used to validate that they belong to face regions. In recent years, the computer vision field has emerged so much in detecting faces and hand gestures from intelligence and security point of view. One of the main requirements for face detection is that is can handle variations in terms of size, location, orientation and point of view and many more. Features are the backbone of machine learning and in face detection the skin color is the most robust feature to overcome the variations mentioned above and has been used in this paper as the core concept for developing the model. In our model, we have classified every pixel in skin or not-skin categories after a certain threshold by evaluating the color of the pixel. The efficiency of this classification highly depends upon the selected color space. To describe an image in computers RGB is widely used but while classification of pixel in skin or not skin RGB has a downside also that each of the coordinates subject to luminance effect from the lightning intensity of the surroundings which

may lead to misclassification of pixels. Many recent works have experimented changing the color space, such as HSV, to gain the optimal color space, which can be used for face detection more efficiently. As a result, color space is used as an efficient tool to recognize the facial areas. Our model uses these recognized facial areas explicitly defined by the pixels bring the simplicity by their decision rules.

III. RELATED WORK AND APPLICATIONS

A. Clothing retrieval

Since the e-commerce have evolved over time, it has given rise to the interest of recognizing clothing problem. The work of Liu et al [16] shows us an application called street-to-shop in which the application tries to match images of clothing taken from real world to the clothing in the online shopping websites. Kalantidis et al [17] also tries to solve this problem but making the prime focus to the efficiency of mobile scenarios.

B. Attribute recognition

Attributes are responsible for describing a visual characteristic of an image. For example, a user wants to buy a “blue striped shirt” or a “red spectator pump”. Finding attributes for clothing which could be used to solve the above-described problems, was explored in recent papers [6][14]. The clothing attributes commonly focus on detecting clothing composites on upper body recognitions.

C. Clothing and person identification

Clothing recognition also helps in recognizing people in a particular occasion. For example, in a wedding a person will always wear the same dress throughout the wedding function, but let's say in some footage the suspect's face is not visible but dressing style is visible. With the help of clothing recognition a person can also be identified. Similarly, clothing recognition has been used for many purposes such as occupation detection [6], fashion style recognition [5] and many more.

D. Clothing parsing

Clothing parsing belongs to the computer vision tasks, which may not be considered much useful but its importance is described by the above-mentioned examples and for clothing representation. Earlier, it was used as the sketch templates for creating new fashion clothing styles that as a grammar for sketch templates. Dong et al. [18] build an interface for clothing parsing in which that interface was nothing but a basis group of image regions that constitute clothing items.

E. Semantic segmentation

Clothing recognition belongs to the image-parsing problem in which each pixel is assigned a semantic label. For these semantic segmentation, we have used non-parametric method and additionally take pose estimates during parsing.



Fig 1: (a – e) Results obtained using Color Features

F. Style Finder: Recognition and Retrieval

The pace with which today's world is changing the need for searching has evolved from just text search to image search and still evolving. But image searching is not as simple as text searching because image search includes high variability and complexity. And this has been quite challenging for the past few years. Many researches came up with new ideas, techniques and

methods to improve the image parsing. Our model gives a fine grained learning algorithm and multimedia retrieval framework. First, an attribute vocabulary is constructed from the fine-grained dataset. This gives a very good results on recognition and retrieval on Women's fashion coat dataset.

G. Predicting Occupation of Human

Recognizing a human's occupation using image parsing depends upon major factors that contributes to the better accuracy of this problem. Clothing, scene contexts being the major factors. This clothing recognition has a wide scope in terms of its applications.

The information, which we get after recognizing a particular clothing domain, it is proved that this information is very useful for further processing in other domains. Because image parsing not just does the clothing recognition, but also performs the surroundings recognition which provides a lot of information for a single image parsing.

IV. PROPOSED APPROACH

The skin color pixel is the prime feature in face recognition. It helps in identifying the facial regions in the image and the values of skin chromatic helps in segmenting the input image. If we know the color space, it actually reduces the search space by just searching in the related color spaces. The human race has the widest variation in their color, therefore it is important to detect every possible color variance for skin in the input image.



Fig. 2 Sample Input Images

This problem is solved by chrominance invariance of the human skin property. While processing an image it keeps adding the information along the search. For example, skin color matched, next the ratio of the face to the other properties, if holes present in the image then what does it mean and so on.

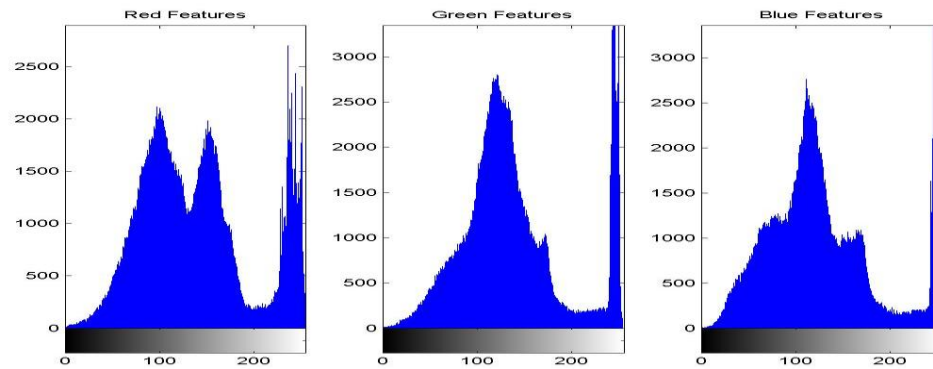


Fig. 3 RGB Histograms

In this paper, we have used Canny and Prewitt edge detection algorithm with identified skin pixels. All the outputs combined and are finally passed to the skin or not skin classification classifier.

Step 1: First the input image is segmented using HSI color space for identifying this skin-regions. On this identified segmented skin regions morphological operations are carried out such as erosion and dilation.

Step 2: After the HSI segmentation, using YCbCr color space, again skin segmentation is performed. Then the same morphological operations, erosion and dilation, are carried out.

Step 3: The segmented images obtained after applying HSI and YCbCr color space, are combined into single segmented image for component analysis. Then the regions larger than a certain fixed threshold is selected for further processing.

Step 4: After coming through a certain threshold, the input image is converted to gray scale image. Further edges in the images, is discovered using Canny and Prewitt edge detection algorithm. These edges help to identify the region boundaries.

Step 5: After obtaining region boundaries, to get the final output image the multiplication is performed with the segmented region images obtained in the second and third step.

The final image after processing, holes are identified. Holes such as mouths' eyes' and so on. The input image that does not identify the holes as the above mentioned one, those segmented regions are eliminated. The final selected regions in the image can be then sent to the face recognition classifier whether the input image belongs to a particular face or not.

V. RESULTS AND DISCUSSION

We have proposed in our system to recognize clothing patterns and colors to help visually impaired people in their daily life. Our proposed system uses the detection of the colors and patterns it gives some new approach to the impairment person. Here the below table indicates some detected colors as audio controller as a speech or sound output. Here we are using OPENCV techniques and methods for our system. In the

future work of our system we include the edge detection and recognition of clothing patterns, colors our system uses the morphological methods and operations.

VI. CONCLUSION

This paper describes the importance of clothing recognition and tries to show that it is the vital part in the direction of an intelligent image understanding. So far, the authors concentrated much on object detection, segmentation, object recognition and so on, by looking at things individually in different dimensions in images and videos. This paper gives summary of research papers and their scope of the research done so far on clothing styles. Clothing styles makes a human to be viewed differently in shapes and their contour. We could able to derive many attributes from the styles of clothing from the humans, like their status, their occupation, nativity, culture and etc. Also, we could extract useful information from the people those are in uniforms such as departments they belong, cadre and ranks. In this line of research, this paper takes an initiative with the preliminary study on clothing recognition, which is getting the attention of our researchers towards intelligent image understanding. It presents a statistical analysis to evaluate the performance of the methods with respect to success measures like true positive, false negative, true negative and false positive.

VI. REFERENCES

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