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Virtual Trial Room

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ABSTRACT
In 21st century, fashion is not just something we wear, it's a way of life. The amount and type of clothing worn is dependent on physical stature, gender, as well as social and geographic considerations. Our aim is to build a compelling, interactive and highly realistic virtual system, where users/customers can choose between many different types of garments designs and proceed to simulate these garments on virtual users. Here in this paper, we have proposed a system which helps in coordination of everyday fashion. The system "Virtual Dressing Environment" involves virtually trying out different cloth models which is done by mining of the user image, alignment of models and skin color detection of image (clicked from a fix distance). Our goal here is to save time of the users during trying out different attires while shopping in stores or online [15].
Keywords:-Virtual Dressing Environment, Haar Classifier, Size recommendation, 2D-model, Face detection, Haar Cascades.

I. INTRODUCTION

Trying different clothes in stores and finally selecting the right one is a time consuming and tedious task. It may also happen that the cloth ordered during online shopping may not fit the customer and the recent studies have shown that the overall online cloth shopping experience is not satisfactory. Fashion can reflect the age, society, and lifestyle modifications with reality. Virtual dressing environment is online equivalent of the near-ubiquitous in-store changing room. It enables shoppers to try on clothes one or more of size, fit or style, but virtually rather than physically. It has been evident that when customers are unable to try, most will not buy. Recently, Virtual try-on of clothes has received much attention due to its commercial potential. This virtual environment can be very useful for online shopping or intelligent recommendation to narrow down the selections to a few designs and sizes[15].

The entire process initiates from simply the alignment of the user and the cloth models with accurate position, scale, rotation and ordering. The detection of the user and the body parts is one of the main steps in the creation of the system[6]. There are several approaches that are proposed for body parts detection such as face and upper body detection, posture estimation and skeletal tracking. Moreover the description of a human body shape is a complex and application-dependent task. Kjærside et al. [2] proposed a tag-based approach for manual labeling of body parts in order to create an augmented reality of the customer wearing a cloth simulation. One of the methods for the body parts detection is the use of the shape descriptors such as Histograms of Oriented Gradients(HOG)[5]. But it may not be convenient for a continuous body tracking system, the main reason is the use of a limited number of skeletal posture states.

Different approaches that are available for face detection are:

- Finding faces using images with controlled background: This is the easy way out. We can use images with a plain monocolour background and use them with a predefined static background. By removing the background, it will always give us the face boundaries[6].
- Finding faces by color: If color images are used, the typical skin color to find face segments might be used. The main disadvantage here is it is not very robust under varying lighting conditions and doesn't work with all kind of skin colors[9].
- Finding faces by motion: If a real-time video is used, the reality that a face is almost always moving can help a lot. The face can be easily detected by calculating the moving area. The main disadvantage here could be,if there are moving objects in the background[7].
- Combining all the good techniques: The several good approaches can be combined,which would yield an even better result.

The various advantages our system would serve are as follows:

- It helps to make a right choice for the size of clothes without actually trying it [4].

- Provides a platform for experimenting with clothing style.
- A wide range of other services like jewelry, glasses and hair style recommendation can be done by using the 2D model generated[11].
- The precious time of consumers would be saved by this system, as it reduces the human effort for trying many clothes.

In this work, extraction of the user based on Face Detection using Haar Classifiers is shown in section II. Image Processing using OpenCV is explained in detail in section III. Section IV gives us the background removal technique. Section V gives results and conclusion and section VI lists the references.

II. FACE DETECTION USING HAAR CLASSIFIERS

For Haar classifier object detection the core basis is its Haar-like features. Rather than using the intensity values of a pixel, these features use the change in contrast values between adjacent rectangular groups of pixels. Then the contrast variances between the pixel groups are used to determine relative light and dark areas in the image. The haar-like feature is formed by two or three adjacent groups with a relative contrast variance. The haar features can be easily scaled and examined by increasing or decreasing the size of the pixel group. Haar like features as shown below can be used for face detection[1].

Fig 1. Edge features

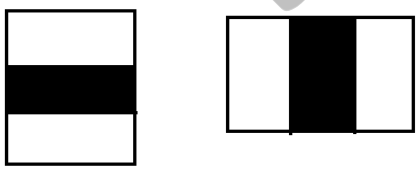

Fig 2. Line features

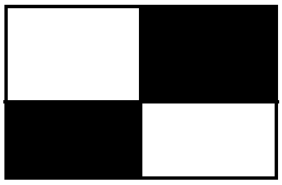

Fig 3. Four Square Features

OpenCV comes with a trainer as well as detector. It can be trained with your own classifier for any objects like cars, cricket bat etc. We have used OpenCV to create one such trained classifier.Here we will deal with face detection. OpenCV already contains many pre-trained classifiers for face, eyes, smile etc. Those XML files can be stored at our desired path. We have developed face detector with OpenCV using haarcascades. Initially we need to load the required XML classifiers in our system. We have used the haarcascade_frontalface_default.xml as the base xml file. Later on the input image (or video) in grayscale mode which is captured by the camera of the system is loaded.Now we find the faces in the image. If faces are found, it returns the positions of detected faces as Rect(x,y,w,h). We can create a ROI for the face detected, when this locations are detected[8].

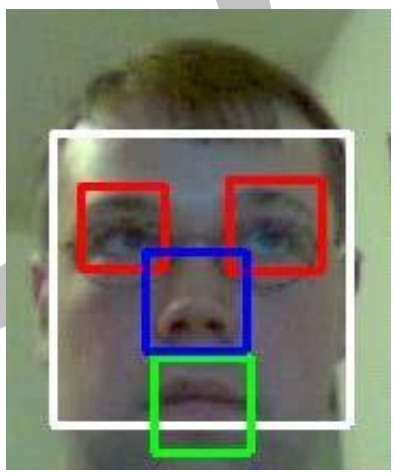

Fig 4. Result image of Face Detection

III. OPEN COMPUTER VISION (OpenCV)

It is an open source software. OpenCV has C, C++, Python and Java interfaces which supports Windows, Linux and Android. It was basically designed for efficient computation. The OpenCV library can take advantage of multi-core processing as it is written in optimized C/C++. The usage ranges from interactive art, to the inspection of mines and also stitching maps.[13]

The following modules have been used in our Virtual Dressing Environment:

- core:

  Core is the basic module. The basic data structures (e.g.- Mat data structure) and basic image processing functions are included in the core. Other modules like highgui, etc also make use of this module.

- highgui:

  Highgui provides simple user interface capabilities, video codecs, image and video capturing capabilities, handling track bars, manipulating image windows and mouse events and etc. If we use User Interface frameworks like Qt, WinForms, etc we need more advanced User Interface capabilities.

- imgproc:

  The imgproc module includes the basic image processing algorithms like image filtering, image transformations and color space conversions etc.

- video:

  It is a video analysis module which has object tracking algorithms and background subtraction algorithms etc.

- objdetect:

  The objdetect includes object detection and recognition algorithms for standard objects.

IV. BACKGROUND REOMVAL

Fig 5. Background Removal. Image with white pixels(left),transparent image(right)

The cloth models downloaded from web usually have a white background. To view the cloth models on the user, we need to avoid the occlussions of the cloth models with the user's body parts. For this purpose, we have used a technique called Background Removal. In this technique we make the pixels with RGB values ranging between 230 and 255 as transparent by anding the rgb value with 0x00FFFFFF[14].

V. CONCLUSION

After an introduction, the related work was presented; starting with cloth selection and virtual dressing environment, cloth size recommendation system is available. Further a broader look on the technologies and frameworks that were used for the implementation, like Haar classifier algorithm, of the Virtual Dresssing Environment was implemented. After this the different aspects of the design process up to the construction of the garment models were highlighted. This is followed by the screenshots of implementation of Virtual Dressing Environment.

Fig 6. Image of cloth model placed on user

In the last section the tests were executed, also discussing the output, the appearance and the interaction with the Virtual Dressing Environment. Overall, the presented Virtual Dressing Environment seems to be a good solution for a quick, easy and accurate try-on of garment. In this system compared

to other technologies like augmented reality markers or real-time motion capturing techniques no expensive configurations and time-consuming build-ups are required. From this point of view it is an optimal addition for a cloth store and online shopping.

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