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Virtual Trial Room

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***Abstract*- This paper presents Virtual Trail Room which enables the user to try on different sizes of clothes, fit and style virtually instead of trying physically which is time consuming. The proposed interface which is human friendly in a three stage algorithm: detection and sizing of the costumers body, detection of reference points based on face detection and upper body points(the shoulder points),and superimposition of the clothing over the costumers image. Compared to other VTR techniques, the key difference is the less costing and dependency over heavy and huge costing hardware component or peripherals. The proposed technique is software based and is designed to be universally compatible as long as the system has a camera**.

Keywords— Virtual trial room, face detection, Haar classifier, positioning, blending, superimposing.

1. INTRODUCTION

The In 21st century, fashion is not just something we wear; it's a way of life so it needs to be a wonderful experience while spending so much of time buying it. We all know during the sales the stores become the most crowded place and it becomes even more worse when we need to try some clothes and there's a huge line in front of you. Also sometime they don't even allow the costumers to take more than three garments at a time. From the costumer point of view due to so much of waiting and frustration the costumer just sees the product and assumes the size and buys it and after purchasing regrets buying due to the sizes problem.

Our goal is to save time of the user during trying out different clothes while shopping in different stores or online. The problem can easily be solved using open source software like Open CV. We have proposed a system which helps in coordination of everyday fashion while saving time of the user and enhancing the experience. This allows the user to see a virtual image of themselves in the desired cloth of their preference and interact with the virtual mirror. The proposed algorithm is designed in a way which will be compatible on any computational efficient system having a camera. This feature makes the proposed algorithm highly independent and cost efficient.

2. BACKGROUND STUDY

The idea behind making of virtual clothes is not new, it's been publicized a lot and the keen interest of the users towards this has increased the growth of this [2][4]. Most of the earlier applications have tried using this by just overlaying the static image of the cloth over the image of the user captured by the camera. But the user has to align themselves according to the clothing image which was not personified and also not a great experience. Also it helped in no way to user to understand the clothing better but as we can say it was the starting of the application. But we all know behind this there were huge advancements and solutions which were more in sync with actual reality that became the motivation for this. These advancements were majorly in only two parts: the alignment of clothing according to user, and the realism of the clothing.

A. Alignment of Clothing

The prior attempt at Virtual Trial Room was the alignment of the user. At the very primitive application, the static image of the cloth was displayed on the screen and the user has to align him according to the static image. There were more appropriate techniques to achieve a proper positioning and alignment of the cloth to the tracked user. It was possible using some hand -held markers by the users. We would receive, combining video tracking and image identification techniques to develop some 3D information from RGB images. The markers were used for positioning, adjustment and scaling. But these markers were not as user friendly.

B. Realism of clothing

One of the highest prior of making Virtual Trial Room was to give a realistic visual experience to the users of trying out clothes without even wearing it out. So it highly depends on the alignment of cloth for the maximized experience. Different material feel differently such as cotton would feel different as compared to silk. At first it was just a static image of the cloth the size was fixed, to it was difficult for the user to actually judge the clothing.

3. EXISTING TECHNOLIGIES

Using Microsoft's kinect and Asus Xtion devices:

There are several commercial products available now in the market for virtually trying out clothes. This has reached a boom in the market. So the current existing technique which is in a popular demand is using Microsoft's kinect and Asus Xtion devices. In this when the person stands in front of the screen which is which is with a kinect scanner it detects the human body according to its coordinates and prepare a human skeleton as per that. As soon the structure is made a 3D model of the user is prepared. The model can be rotated, also can use a color map to analyze the fit. The scanning is done by these devices [6] .
These devices are highly hardware dependent and needs a high cost for building this. Microsoft Kinect costs more comparatively other options available in the market. So to build devices in each would cost a lot. Also the dependency over the hardware will decrease the efficiency of the computation. It will become a liability. Also the damage caused once will be highly payable.

4. PROPOSED WORK

4.1 Face detection using Haar cascade classifier (shoulder detection also)

As when the user comes in front of the screen, to detect the user the discrete structure which is to be identified is the face. So to detect the face, we use Haar feature-based cascade classifiers. In haar classifier instead of using intensity values of the pixel, it uses the change in contrast values between adjacent groups of pixels. Then the variance difference between the pixel groups is used to determine the relative light and dark areas in the image [1].
It is a machine learning approach. So to work well with the algorithm the cascade function is trained from a lot of negative and positive images. A lot of negative images (images without faces) and positive images (images with faces) are shown to the classifier to train it so it can extract features from it.
The purpose of using OpenCV makes it easier as it comes with pre-trained classifiers for face, eyes, smile etc. It comes with a trainer and a detector; we can train it with our own classifier easily for any object detection. In this paper for face detection we used OpenCV to create a trained classifier using haarcascades which will easily detect a face in an image. These pre-defined classifiers are in form of XML files which we store at our desired path. For the start we need to load the XML classifier in our system. As soon as the base xml file is loaded the image captured by the camera of the system will be loaded. The processing starts if it finds a face it returns the position of detected face as Rect(x,y,w,h) [3]. In the same way the classifiers trained are trained for upper body detection. Once the shoulder coordinates are detected even they are stored in that format only for further processing. The detected face and shoulder is shown in figure as follows:

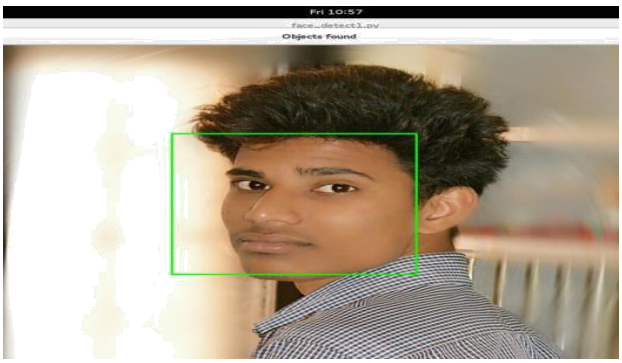

Figure 1. Result image of face detection

4.2 Open Computer Vision (OpenCV)

OpenCV is open source software which has C, C++, Python and Java interfaces which supports windows and Linux. It is designed for highly efficient computation. Thus we have certain modules of OpencCV in our proposed project. The modules are as follows:

a. core:

It is the basic module of OpenCV. The basic data structures and image processing elements are present in the core. So the start of the project begins with using this element.

b. highgui:

this provides user friendly interfacing capabilities, which we need while designing the gui. The interface should be easy and very compatible for the user to use. Also maximizing the properties given to the user to enjoy. If we other User Interface Frameworks we will need more advanced User Interface Capabilities.

c. video

It is a video analysis modulue which is used to perform object detection and background subtraction algorithms.

d. imgproc

This module basically consists of basic image processing techniques such as image filtering, image transformation etc.

4.3 Superimposing

4.3.1 Image masking

If the image has a lot of noise around the outside of the image which is not necessary then in that case image masking is used to analyse the image. This process involves basically setting the pixel vale of an image to zero, or of some other background value. Image masking can be done in two ways: using a image as a mask or using a ROI as the mask. We have chosen image as the mask in our project.

a. Using image as a mask:

In this simply the image masked has some of its pixel intensity values set to zero. In the image wherever the pixel intensity value is zero automatically the pixel intensity of the resulting masked image will be set to the background value which is normally zero.

b. Using ROI as a mask:

To define the mask the ROIs for each slice is used. If required, masking can be controlled on slice by slice basis in ROI toolkit. In ROI toolkit, masking operations does not affect a slice without ROI.

4.3.2 Blending (bitwise-AND operator)

We can add two images using OpenCV functions and the function used is cv2.add(). But for addition of images in OpenCV the images should be of same depth and type. So for blending or adding images with different depth image blending is used with a function cv2.addweighted(). This is done so that is gives a feeling of transparency or precise blending of the images. Using this we can also perform transitions of one image to another.

Bitwise operation is implemented on individual color components RGB. In our proposed paper we have used bitwise-AND operator. The working of bitwise and operator is it compares each bit of its first operand to each bit of its second operand. If the bits are 1, then the resulting bit is set to 1 otherwise it is set to zero. For example we want to put a logo above an image, and then if we add two images it will change the color. But if we blend the image it will give transparent effect. But the required par is we need an opaque effect. So to achieve this we can use bitwise operations.

4.3.3 Edge detection

There are various edge detection techniques. We have used Canny Edge detection technique [5]. To perform this edge detection technique Gaussian filters are used. These filters cut out the noise in an digital image to prevent any false detection by the processor. This does the work of smoothening and reducing the effect of noise on the image for the proper functioning of the processor. With this the intensity gradients of the image are not found out. The edges in the image can point in various directions like horizontal, vertical and in diagonal edges, so this algorithm uses four filter to detect all kind of edges in blurred image. After this process non-maximum suppression is applied to make the edge thin. This suppressions results in quite accurate edge pixels in reference to present real edges. Also some pixels my be caused by the noise, then for such pixels double threshold is applied.

4.3.4 Scaling (resize function or interpolation method-inter area)

In this proposed paper scaling is required to control the sizing of the cloth. Scaling means resizing of the image according to the circumstances. As when the user moves in front of the mirror screen the changes in sizing of the colt should place accordingly. When the user moves towards the screen the image size should be increased according to user bur the actual measurements of the cloth should not increase. Suppose the person is trying out clothes with a measurement size S, as when the person moves in front of the screen the size should not change to a size M or L. Just the overall view of the cloth should be increased or decreased accordingly. This is done by scaling method.

The parameters required for scaling are as follows:

src- the input image
dst- the output image
dsize- if the output image size is equal to zero, it is computed as
dsize = Size(round(fx*src.cols), round(fy*src.rows))
The dsize or both th fx and fy should be zero.

fx- scale factor along the horizontal axis, when the value is equal to zero.
fy- scale factor along the vertical axis, when the value equal to zero.

And the parameter used in our project is Interpolation Method and the its subpart which is INTER_AREA
INTER_AREA: resampling of the image using pixel area relation. It is a preferred method is as it gives a moire-free results for image decimation. It is similar to INTER_NEAREST method when the image is zoomed out.

4.3.5 Clipping

Clipping basically means selectively enabling or disabling rendering operation within a defined region of interest. In this paper as when the upper body is detected the cloth will be superimposed on the user in the mirror. The coordinates obtained by upper body detection using haar classifier should be really précised. As when the précised value is obtained the cloth will be imposed accordingly. So for these coordinates to work properly clipping is done. Clipping is basically done over here to improve the rendering performance. Lines and surfaces outside the structure volume are removed. By using clipping a lot of the time of the processor is saved. As it skip the pixels which the user cannot see. Its working is as the pixels that will be drawn are said to be within the region and the pixels which are not be drawn are outside the region which is to be clipped.

5. PRODUCT DESCRIPTION

The costumer will stand in front of the screen which is the mirror that has a web camera. Through Open CV the image captured via camera will be processed as followed by face detection and upper body detection. As when the human is detected the user can choose the attire whatever they want as per their requirements. The attires they want would be displayed in front of them. As soon they choose the attire the model of the cloth will be superimposed virtually on their body in the front mirror. Now they can easily see what the attire looks on them virtually without even trying it out. If the users picked cloth is an ill fit they can choose the smaller or larger sizes respectively. Keeping in mind the person should not go too close to the mirror/screen otherwise a message will be displayed "too near to the screen step backward". So this is how our proposed product is going to work.

6. CONCLUSION AND FUTURE WORK

We developed a Virtual Trial Room application that does not require high end hardware components. We have tested our application for different sort of conditions and it works well. The project can be further improvised in many forms such highly realistic models using 3d cloth and much more. Also number of functionalities provided to the interface can be extended to any extent as per requirements of the users making me more compatible and friendly for the users.

REFERENCES

[1] P. Ian Wilson and Dr. J. Fernandez "Facial feature detection using Haar classifiers," JCSC 21, 4 (April 2006)
[2] Mujahid, 2a et al. "Modeling Virtual Cloth to Display Realistic Shape and Force based on Physical Data. " *Transactions of the Institute of Systems Control and Information Engineers* 16.4 (2003)
[3] J. Young Choi, Y, Man Ro and Konstantinos N. Plataniotis, "Color Local Texture Feature For Color Face Recognition" in proceedings of IEEE Conference, 2011.
[4] Wallner, Guenter. "Simulating animating and rendering clothes." *Dana* (2003)
[5] G.T. Shrivakshan and Dr. C. Chandrasekhar, "A Comparison of various Edge Detection Techniques used in Image Processing", IJCSI international Journal of Computer science Issues, Vol. 9, Issues 5, No 1, September 2012.
[6] Skytu,2011. http//www.styku.com/business