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IMPLEMENTATION OF AUGMENTED REALITY USING HAND GESTURE RECOGNITION

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Abstract— **The Internet has become an essential part of our daily life, and companies realise that the Internet can be a shopping channel to reach existing and potential consumers. An online shopping system that permits a customer to submit online orders for items and/or services from a store that serves both walk-in customers and online customers. The online shopping system presents an online display of an order cutoff time and an associated delivery window for items selected by the customer. With this consensus Online Shopping as a whole has rapidly grown. The biggest surprise is that clothing is one of the top categories purchased online.**

In this project with the better interactive features in clothing websites will boom sales over the internet. Here, the customer will be provided with an additional facility of determining the actual view by making him upload his photos in various angles and then matching the photos with cloths available, sorted as per his choices. Customer can also choose different range of wrist watches, glasses and caps and see that it match them perfectly on their uploaded photo or not.

In this project, the main aim is to demonstrate that with better interaction features in clothing web sites could improve sales over the net. With the help of the our project the customer will be able to view his choices on screen according to him and thereby can make better decisions.

***Index Terms*—Augmented Reality, Hand Gestures, E-Shopping.**

I. INTRODUCTION

A virtual dressing room (also often referred to as virtual fitting room and virtual changing room) is the online equivalent of the near-ubiquitous in-store changing room – that is, it enables shoppers to try on clothes to check one or more of size, fit or style, but virtually rather than physically.Having begun to emerge from 2005,fit technologies started to be widely reported from 2010,but are now available from an increasing variety of providers and are in use by a growing number of prominent retailers in their webstores. A fit technology may be categorised according to the problem that it resolves (size, fit or styling) or according to the technological approach.

Virtual dressing rooms for the fashion industry and digital entertainment applications aim at creating an image or a video of a user in which he or she wears different garments than in the real world.

We suggest an approach that allows users who are captured by a set of cameras to be virtually dressed with previously recorded garments in 2D. By using image-based algorithms, we can bypass critical components of other systems, especially tracking based on skeleton models. We rather transfer the appearance of a garment from one user to another by image processing and image-based rendering. Using images of real garments allows for photo-realistic rendering quality with high performance.

II. PROPOSED SYSTEM

We proposed a system where users are willing to buy any product are expected to be computer users with minimal computer knowledge. However, the user interface of the system is made very simple and user-friendly to the customer.

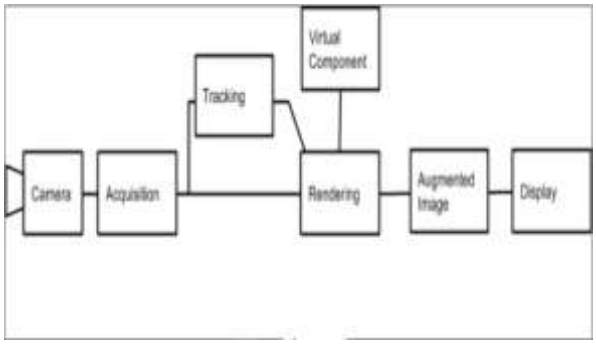
The customer is provided with the option of either presenting his/her physical measurements or to select the body type that best matches with his/her body type. The selected body type is mounted with the face and is presented with the clothing or apparel choosen. Thus, they can have the feel of real time purchase.

The user interface is designed to facilitate the above shopping tasks. These tasks are combined into menu system as the Augmented Reality window .Through these menu, users can access full description which is designed for Augmented Reality.Through the Webcam, hand gesture is recognized, product associated with that is selected. Product from the database is loaded on the Screen and the Users can pick one of virtual products from all and manipulate it, User can move or rotate the model, and also see the Inner view of the product and view all specific information about that product, such as Product name, it's price, size of it, and lots of thing that help to customer make their purchasing decision in more reliable way.

III. SYSTEM ARCHITECTURE

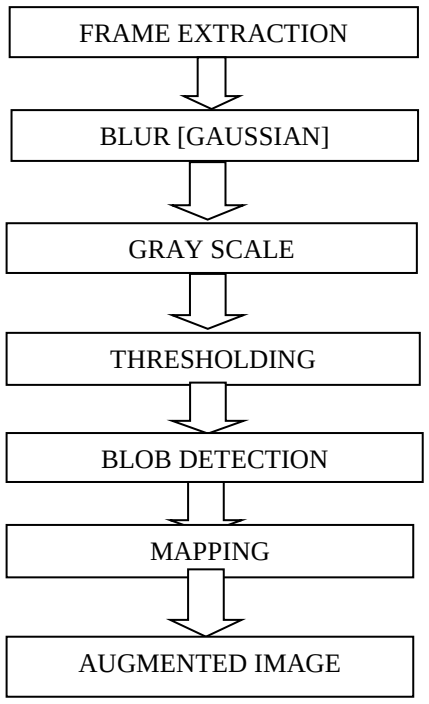
Our proposed system includes hand detection and recognition and the data is retrieved from the database as highlighted in Figure 1. Each user can easily use the system, control the system, view the previous and next Product and obtains all information regarding that product.

At First user accesses the Application GUI, the webcam will start the process of Hand detection and Recognition. User just needs to use hand to access the system within the Screen zone, and when the user uses hand gesture to choose the different options the system acquires the information from the database. After accessing all information from the database, the required information is visible on the screen or the display.



At first, the hand gesture movement is captured by Webcam as video feed. From the video feed, frames are captured and send for processing. In processing all captured images are blurred for better detection and from these images all are converted into HSV color model for obtaining accurate color. Next, thresholding for converting image into binary images are carried out. From these blobs, gesture is recognized. The last step is pre-processing the recognized gestures and according to that gesture command associated with that is send to system and then information regarding to product which user demands is then retrieved from database. When user chooses any option through hand movements, and from these option, the system will get all information and finally display it on the screen.

IV. HAND GESTURES DETECTION AND RECOGNITION



V. ALGORITHMS

A. Blurring

When Web camera grab an images of user Gestures, all images get blurred to reduce sharpening effects. By reducing sharpening effects we get more accurate detection. We split all RGB value separately and Calculate the RGB average of surrounding pixels and assign this average value to it. Repeat this above step for each pixel and finally we get blurred images of Hand Gestures. The flow steps of blurring an image are as follows.

Steps 1 Traverse through entire input image array.
Steps 2 Read each single pixel color value (24-bit).
Steps 3 Split the color value into individual R, G and B 8-bit values.
Steps 4 Calculate the RGB average of all surrounding and assign this average value to it.
Steps 5 Repeat the above step for each pixel.
Steps 6 Store the new value at same location in output image.

B. Grayscale Algorithm

After blurring all images, all blurred images are transferred into HSV (Hue, Saturation, Value) model. HSV is stronger model than RGB because it offers a more intuitive representation of the relationship between colors. HSV selects more specific color.

In HSV model value of „H" and „S" remain constant if the value of „V" changes, but value of RGB changes with the change in „V". So we get True color value. Figure 4(a) shows input image, 4(b) shows image with Hue,4(c) saturated image,4(d) represent Value through which we get grayscale image. The flow steps for conversion of RGB to grayscale image are as follows:

Steps 1 Initially all the images are stored in array.
Traverse through entire input image array.
Steps 2 Read each single pixel color value (24-bit).
Steps 3 Calculate the grayscale component (8-bit) for given R, G and B pixels using a conversion formula.

Grayscale = (r +g +b) / 3;

Steps 4 Compose a 24-bit pixel value from 8-bit grayscale value.
Steps 5 Store the new value at same location in output image.

C. Image Thresholding Algorithm

For recognizing Hand Gesture we use Thresholding. Image segmentation can be easily done by the simplest method i.e. thresholding. From a grayscale image, we use thresholding method that can be used to create binary images i.e. image which have only 2 colors, black or white. It is usually used for gesture extraction where required gesture from an image are converted to white and everything else to black (or viceversa). The flow steps for grayscale image thresholding are as follows

Steps 1 Traverse through entire input image array.
Steps 2 Read individual pixel color value (24-bit) and convert it into grayscale.
Steps 3 Calculate the binary output pixel value (black or white) based on current threshold.
Steps 4 Store the new value at same location in output image.

D. Blob Detection Algorithm

After getting binary image in the form of only Black and White, we get white blob and rest black (Vice versa), we must have to detect these blobs. For detecting blob firstly, Starts from the first line of the image and find groups of one or more white (or black) pixels. Group of one or more white pixels are called as lineblobs. Find X, Y co-ordinates of each those blob .Number each of these groups. Repeat this sequence on next line. While you are collecting the lineblobs, check whether the lineblobs that checked before this current line and see if these blobs overlap each other. If so, you merge these lineblobs by using there X and Y co-ordinates to one blob it will treat as a whole blob. Repeat this for every line and you have a collection of blobs.

E. Mathematical Model

Technique used for determining the mathematical analysis of the project:- "SET THEORY"

VI. INTIALIZATION

Let 'S' be the universal set of 'augmented image'.

S is a set of 7 modules.

1] $S = \{U, P, I, I_B, I_{GS}, I_{TH} I_{BD}\}$

2] $U = \{U_1, U_2, U_3 \ldots\ldots U_n\}$

3] $P = \{P_1, P_2, P_3 \ldots\ldots P_N\}$

4] $I = \{I_1, I_2, I_3, \ldots\ldots I_N\}$

5] $I_B = \{I_{B1}, I_{B2}, I_{B3} \ldots\ldots I_{Bn}\}$

6] $I_{GS} = \{I_{GS1}, I_{GS2}, I_{GS3} \ldots\ldots I_{GSN}\}$

7] $I_{TH} = \{I_{TH1}, I_{TH2}, I_{TH3} \ldots\ldots I_{THn}\}$

8] $I_{BD} = \{I_{BD1}, I_{BD2}, I_{BD3} \ldots\ldots I_{BDm}\}$

Where,

S = S is a universal set of 'augmented images'.
U= Number of users.
P = It is the set of products available to the user.
I = It is the set of images.
I_B = It is set of blured images.
I_{GS} =It is a set of gray scaled images.
I_{BD} =It is a set of blobbed detected images.
I_{TH} = It is a set of thresholded images.

1] The original RGB image is given as input to the blurring image function which in turn gives the blurred image.

Blur(I) =$\{I_{B1}, I_{B2} \ldots\ldots I_{Bn}\}$
Blur(I)=I_B

2] The blurred image I_B obtained is given as input to the gray scale function which in turn gives us the gray scaled image.

GS(I_B) = $\{I_{GS1}, I_{GS2} \ldots\ldots I_{GSn}\}$
GS(I_B)=I_{GS}

3] The gray scaled image is given as input to the thresholding function which in turn gives the thresholded image.

TH(I_{TH}) = $\{I_{TH1}, I_{TH2} \ldots\ldots I_{THn}\}$
TH(I_{TH}) =I_{TH}

4] The thresholded image is given as input to the blob detection function which in turn gives the blob detected image.

BD(I_{BD}) = $\{I_{BD1}, I_{BD2} \ldots\ldots I_{BDn}\}$
BD(I_{BD}) =I_{BD}

5]The Output of the Aug() function gives us the augmented and mapped image of the client.
Aug(U,P) = S_{aug}

VII. TIME COMPLEXITY

The time complexity of the final result is 0(n^2).That is Quadratic time,then we say the algorithm runs in polynomial time and the problem it solves is in class P.

VIII. RESULT ANALYSIS

A. Controlled Environment

B. Bright Environment

C. Crowded Environment

D. Dark Environment

IX. CONCLUSION AND FUTURE WORK

The online shopping system has become an indispensible part of ecommerce world today. The investors realizing this huge markets, are always finding ways to improve the shopping experience of customer and always find innovative ways to lure them. This will give a clear picture about the apparel he or she is going to buy and leave no ambiguity on how it will look on them irrespective of their body type. Also, more options to pay will provide ease and assurance about the money being spent. A lot more development can be done in the existing system by incorporating dynamic augmented reality i.e.the view of the customer varies in the virtual view as he or she moves in reality which is also the future scope of this system.

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