

Virtual Trail Room using Haar Cascade Classifier

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Abstract—In-store shopping experience continues to be the primary thing that involves mind for many people after they consider shopping. Although customers can wear clothes in real time, this process is simply too time consuming whenever there are queues lined up ahead of the trial room. This project VTRHC can change the way an individual tries out clothes and shop for the right one. Customers can assume a good range of clothes without having to physically wear them due to the concept of "Virtual Reality." Our goal is to create a virtual room environment that may be useful in the long term in order to increase time efficiency and improve accessibility to clothing. Various research groups have implemented the concept using various approaches. One of the research groups used a Kinect sensor and therefore the other used clustering for clearing the background and getting the border lines of the body. The best point of this strategy is that it saves time and work when it involves physically fitting items. The Open-CV is employed to enable the camera and take a user's live video then the garments onto the customer's body. We have used Haar Cascade Classifiers and Flash web framework.

Index Terms— Object Detection, Haar Cascade Classifiers, Flask Web Framework.

I. INTRODUCTION

In recent days everything became online like we are able to get the things that we would like through online. And also because of growth in technology we are heavily tormented by smart systems. Online marketing helps the producers to bring out their kinds of products to a mass within the simplest way. Online shopping expanded quickly, and more people are becoming accustomed to using it to buy their desired products, engage in auctions, etc.[1]. For purchasers, online shopping would give more information and availability of every kind of product in every stream. So here the biggest problem for the purchasers online is that they can't try the garments while buying it. Shopping centers and the retail sector have grown as a result of rapid urbanization. Despite being a weekday, there is more congestion in the malls today. Shopping is hindered by large crowds, especially when purchasing clothing. Despite the advantages of purchasing online, there are some drawbacks that prevent customers from purchasing items online[2]. The most common issue that online customers face is being unable to do things, particularly for clothing. The majority of them want to see if the clothing fits them because sometimes the clothing purchased does not match the scale provided by the vendor. Offering a return policy or free shipping for returns aims to catch up on incorrect fitting and sizing content, but it will cause the vendor a lot of trouble. Customers can try their clothes online and can select their clothes as they need. They can try virtually and might decide if it's good for them or not. So, after getting the dress and trying it at that point they won't have any regret because they're going to know before only how the dress looks on them[3]. The customer can see the dimensions, style and fit of overlaying an item on a live video feed of a customer. This all can be done before they have bought it. As we know from the important world example Lens kart as an example[4], we will actually

try clothes which might be helpful for humans to scale back time and productivity of industries. Therefore, the purpose of this paper is to virtually dress without having to go to the trial room. We'll accomplish that by utilizing

i. Haar Cascade Classifiers and this may be done by installing the necessary libraries. To search out these points we use adaboost classifier and this identifies the basic important points[5]. The most objective of the proposed system is to reinforce customer experience in clothing fitting by enabling customers to virtually try clothing on as to test for size, fit or style. The customer's concern of adapting the garment to fit their own figure or complexion, which prevents them from touching the fabric when purchasing from a distance, is the key hindrance on the contrary[6]. This results in a higher return rate than in other e-commerce industries. Since refunds can account for up to 60% of transactions, e-sellers are considered as the major practical issue.

II. RELATED WORK

They used the OpenCV and TensorFlow lite technologies to create an android-based mobile application. Using computer vision, which first identifies the customer's body and then maps the garments onto it, the mapping of the clothes is carried out. They used a three-tier architecture, consisting of a database, a main logic layer, and an app interface[7]. To locate important points on the body and detect it, TensorFlow Lite is employed. The mapped image is then obtained by use of OpenCV. They located the points of intersection in the image and used them to map a particular set of clothing items onto the user. Shoulders and hips are the POIs for clothes on the upper torso[8]. They also need to locate the POIs on the garment in order to map the clothing item. On the majority of garment photos, pose estimation fails. Therefore, they should be marked by hand. They utilized OpenCV's homograph feature to map. When two matrices are used, holography determines a transformation matrix between the two of them. The four POIs from the apparel garment and the user picture would constitute the two matrices[9].

In this paper they used Laplacian filter and edge detection for detecting the contour of both lower and upper body. After then they extracted feature points based on the basic structure of humans with these points of reference, they used to map the cloth of the body[10]. But the main disadvantage is that this application is only for men. They designed this application only for men's wear. They started by extracting the foreground, then the human silhouette, then the feature points, then the warping of the shirt, and finally the virtual fitting[11]. They described a Microsoft Kinect Sensor-based virtual changing room application in their article. The location of users in front of the Kinect sensor array is provided via the Skeleton API, together with precise position and orientation data[12]. These skeletal data are used for GUI control and measurement of various user parts.

In the application described in this paper, Haar Classifiers are used. The techniques and technologies employed are based on static augmented reality, in which the subject must adjust itself to the outfit that automatically appears on the screen[13]. The difficulties this paper has are as follows: Our body's measurements are not taken into consideration, and the lack of body detection leads to much less results[14]. Using Deep Neural Networks, they have enhanced the virtual trial room application where they have used two webcams in order to capture the human body and Stereo Vision Concept was used to measure Body Measurements with this basically formed a 3D avatar model[15]. Here the limitations were GPU used are low if they have used high performance one the accuracy would be high. This kind of virtual technology is also useful in order to perform kind of operations using virtual mouse[16].

III. METHODOLOGY

Collecting Pictures of Clothes: Figure 1 shows the system design. Since we are using classifiers to perform the training, we simply need a limited quantity of images. We therefore only collected 20 photographs of clothing, of which a few will be used for men's T-shirts and a few for women. These pictures are essential for mapping the product to the human body. More different Images from the collection offer greater accuracy in a variety of intricate backgrounds. Google was used to collect this series of images.

Identification of a Person: For the identification of the person the object detection is used which is done by using Haar Cascade Classifiers. Actually, the Haar Cascade Classifiers are used for detecting the body parts. For our project we need to identify the upper body part of the human so we classified and used the above method. We have trained our model to identify humans rather than objects. As the testing process we kept objects also in order to detect only the human body. The Process starts when the user opens the website and selects the particular website that the user wants to try on. There are six stages we conduct in order to provide selection of cloths to the user for checking purpose.

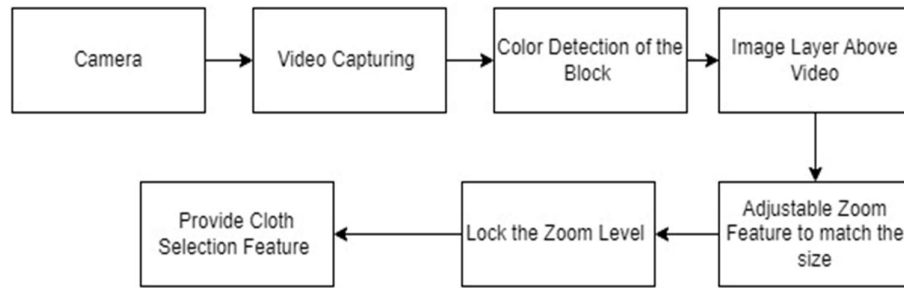


Figure 1: System Design

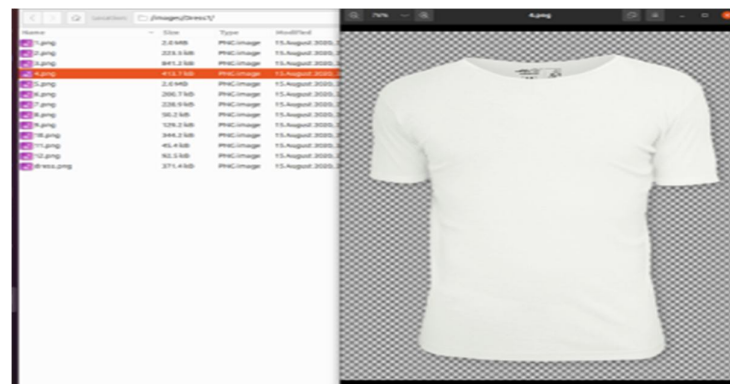
In these we have used Haar Cascade Classifiers. First of all, we need to detect body parts of the target human body and we need to transfer things according to suitable body parts. So, for body part detection we used a haar cascade dataset. Haar Cascade classifier is basically a machine learning based approach where a cascade function is trained from a lot of images both positive and negative. Here the positive images mean the images we want and negative images mean the images which are not necessary. Based on the training it is then used to detect the objects in other images. We have different feature sets to detect full body, lower body, eye frontal face. After training the classifier with lots of positive and negative images then it extracts features from it. Features like Haar Features, Edge Features, Line Features, Four-rectangle Features comes under Haar Features. They are just like convolutional kernel. Each feature is a single value calculated by subtracting the sum of the pixels under the white rectangle from the sum of the pixels under the black rectangle. Many features are now calculated using all possible sizes and locations of each kernel. (Can you imagine how much computation is required? Even a 24x24 window yields more than 160000 features). We must find the sum of the pixels under white and black rectangles for each feature calculation. They used the integral image to solve this problem. Whatever the size of our image, it reduces the calculations for a given pixel to a four-pixel operation. However, the majority of the features we calculated are irrelevant. To know the appropriate features, we use Ad boost. The flask microframework served as an interface between the python backend and the front end (html). And for GUI we used the tinder library which was written in python for design user interface.

`@app.route("/")` it means whenever the home page is found invokes the function below it and under that function in the end of that function you are returning a function render template("html file") and whatever html file is given in the argument that html page will be shown in the browser for that this html file should be available in template folder.

`@app.route("/success", methods=["POST"])` it means whenever the route is successful then invoke the function below it post shows that we are sending data to server.

IV. RESULTS AND DISCUSSION

To provide a facility to the end user we have developed a web-based application through which user can view things. A sample dataset with image is showed below.



We have developed a web application for easy access to the user. Like any E commerce webpages are easier for user to interact and choose the necessary items for purchasing. A sample home page is shown in Figure 2.

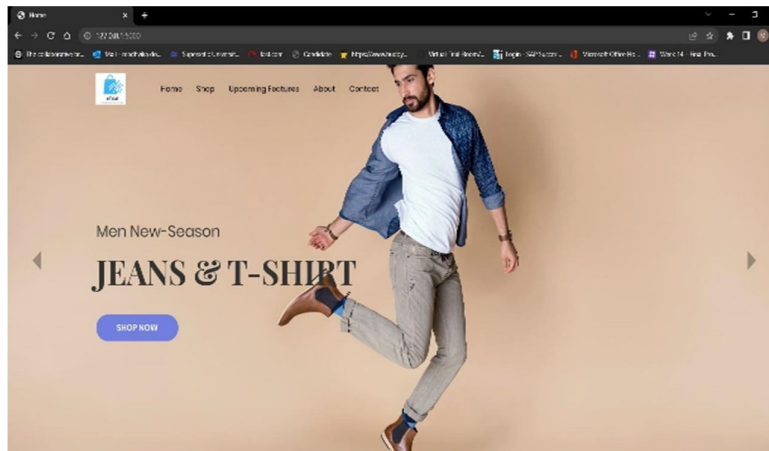


Figure 2: Home Page (Web page)

Address <http://127.0.0.1:5000/> the website will be opened as shown above. As we move further the user gets to choose the clothing between the men and women and below products are displayed as showed in Figure 3.

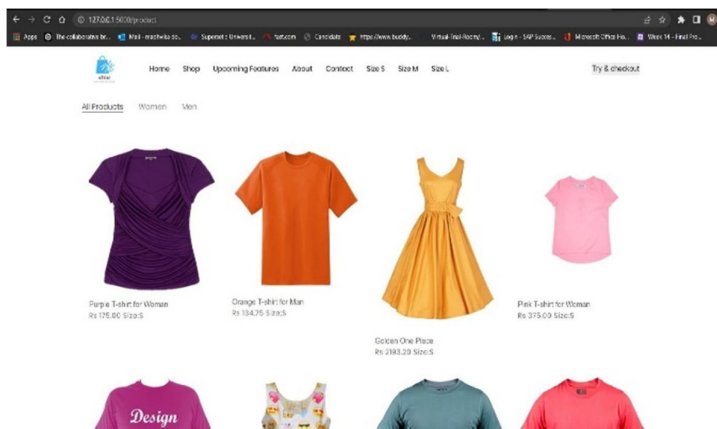


Figure 3: Different Types of Items Displayed to the User

The user can select the product and they can add to cart and they should click try and checkout then one GUI will be opened and then the cloth will be mapped to the body as showed in Figure 4.

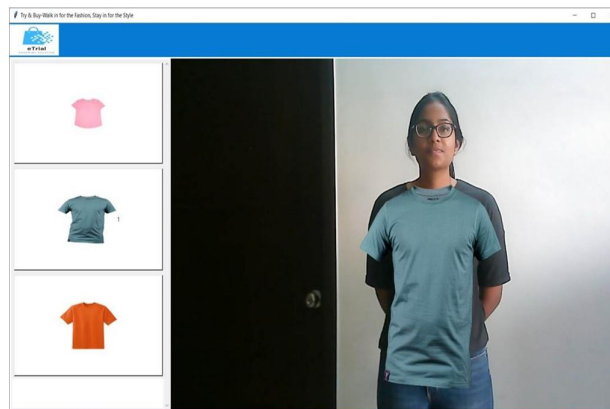


Figure 4: Mapping of selected T Shirt to user

When it comes to multiple users and their mapping, we are able to map the respective selected item to the body of a user. The mapping part is showed in Figure 5 where two users are standing and selected items are mapped to their body. The classifier detects the human body and map the chosen item to them in such away based on the human body dimensions it detects and map the respective item to them.

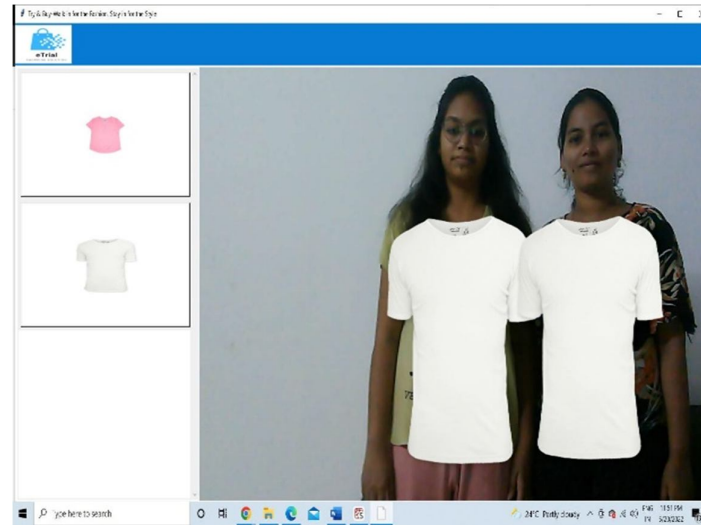


Figure 5: More than one object mapping

We also experimented to test weather model detects only a human body or any object and it won't recognize the other objects but only human body. It is showed in Figure 6. So, the proposed approach is more useful to the public specially to save time by not visiting the shop.

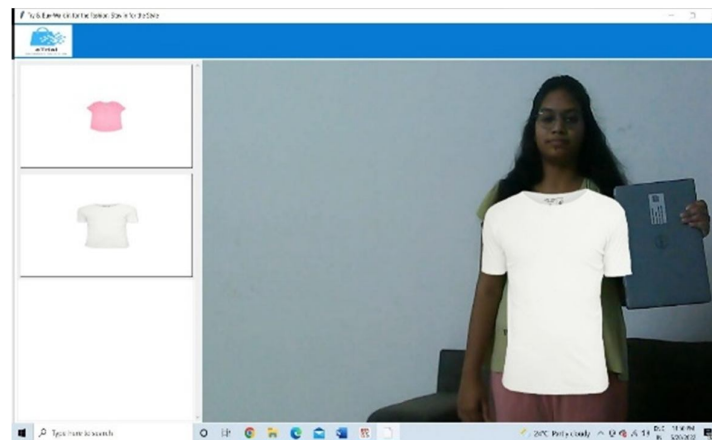


Figure 6: detecting Human than object

V. CONCLUSION

With the Proposed physical body detection and recognition and GUI Automation we expect to produce an easy-to-use tool with better accuracy and map the garments to the person where someone can choose his / her clothes in a very website which is ready using Flask Web Framework. Virtual dressing Rooms are a stepping stone to revolutionizing the E-commerce world. Here, we obtained a technique to map the garments on the user body using the technologies of OpenCV like using Haar Cascade Classifiers and mapping them and displaying them on console applications. This prevents customers from lining up in long lines and allows them to easily and quickly engage in different types of clothing. These are a perennial favourite in the industry as people get busy over time and don't have time to line up in front of the rehearsal room. In these situations, the

application is reassuring and provides the customer with a quick solution. Considering the covid situations, there have been some shopping complexes which refused the customers to try on. This virtual assumption would be a good opportunity during this pandemic.

REFERENCES

- [1] K Srinivasan and S Vivek. "Implementation of virtual fitting rooms using image processing". In: International Conference on Computer, Communication and Signal Processing (ICCCSP). IEEE, pp. 1–3.
- [2] Aladdin Masri and Muhannad Al-Jabi. "Virtual dressing room application". In: 2019 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT). IEEE. 2019, pp. 694– 698.
- [3] Ahmad al Qerem. "Virtual dressing room implementation using body image–clothe mapping". In: Int J Eng Comput Sci 5.2 (), pp. 15859– 15862.
- [4] Kshitij Shah, Mridul Pandey, Sharvesh Patki, and Radha Shankarmani. "A Virtual Trial Room using Pose Estimation and Homography". In: 2020 4th International Conference on Intelligent Computing and Control Systems (ICICCS). IEEE. 2020, pp. 685–691.
- [5] Mirosław Moroz. "Tendency to use the virtual fitting room in Generation Y: Results of qualitative study". In: Foundations of Management 11.1 (2019), pp. 239–254.
- [6] Nauman Zafar Hashmi, Aun Irtaza, Wakeel Ahmed, and Nudrat Nida. "An augmented reality based virtual dressing room using haarcascades classifier". In: 2020 14th International Conference on Open Source Systems and Technologies (ICOSST). IEEE. 2020, pp. 1–6.
- [7] ICS Ileperuma, HMYV Gunathilake, KPAP Dilshan, SADS Nishali, AI Gamage, and YHPP Priyadarshana. "An Enhanced Virtual Fitting Room using Deep Neural Networks". In: 2020 2nd International Conference on Advancements in Computing (ICAC). Vol. 1. IEEE. 2020, pp. 67–72.
- [8] Feng, Liying et al. "A Review of An Interactive Augmented Reality Customization Clothing System Using Finger Tracking Techniques as Input Device." Lecture Notes in Electrical Engineering (2020): n. pag.
- [9] Ediz, Cagla. (2020). Adding Virtual Objects to Realtime Images; A Case Study in Augmented Reality. Sakarya University Journal of Computer and Information Sciences. 10.35377/saucis.03.03.730505.
- [10] Adikari, S.B., Ganegoda, N.C., Meegama, R.G., & Wanniarachchi, I. (2020). Applicability of a Single Depth Sensor in Real-Time 3D Clothes Simulation: Augmented Reality Virtual Dressing Room Using Kinect Sensor. Adv. Hum. Comput. Interact., 2020, 1314598:1-1314598:10.
- [11] Newcombe, Richard & Davison, Andrew & Izadi, Shahram & Kohli, Pushmeet & Hilliges, Otmar & Shotton, Jamie & Molyneaux, David & Hodges, Steve & Kim, David & Fitzgibbon, Andrew. (2011). KinectFusion: Real-time dense surface mapping and tracking. 127-136. 10.1109/ISMAR.2011.6162880.
- [12] Fathi, Hamed et al. "Deformable 3D Shape Matching to Try on Virtual Clothes via Laplacian-Beltrami Descriptor." (2022).
- [13] Xu, Yi et al. "3D Virtual Garment Modeling from RGB Images." 2019 IEEE International Symposium on Mixed and Augmented Reality (ISMAR) (2019): 37-45.
- [14] Chong, Toby Long Hin et al. "Per Garment Capture and Synthesis for Real-time Virtual Try-on." The 34th Annual ACM Symposium on User Interface Software and Technology (2021):
- [15] Pachoulakis, Ioannis & Kapetanakis, Kostas. (2012). Augmented Reality Platforms for Virtual Fitting Rooms. The International Journal of Multimedia & Its Applications. 4. 10.5121/ijma.2012.4404
- [16] U. Sairam, D. K. Reddy Gowra and S. C. Kopparapu, "Virtual Mouse using Machine Learning and GUI Automation," 2022 8th International Conference on Advanced Computing and Communication Systems (ICACCS), 2022, pp. 1112-1117, doi: 10.1109/ICACCS54159.2022.9784972.