VIRTUAL TRY-ON SYSTEM USING MACHINE LEARNING

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ABSTRACT

A lot of potential time-consuming in traditional purchasing may lead to failing customer's trust in apparel industry. So, in e-commerce purchasing, customers get more new collections of apparel, saving money and time. Buying apparel through e-commerce has certain limitations of trying apparel before buying it. However, the proposed system allows customers to experience the fit virtually according to their needs. The main motive of the project is experiencing customer's outfits before purchasing so that customers can improve their decision-making process. A virtual trial room system improves the accessibility of the garments virtually without any discomfort, enhances customers to feel free to try the fit, comfortable to engage with the environment and there are fewer chances of returning and cancelling products. It detects the customer's posture and provides 2D virtual garments that are adjusted according to the posture, thus predicting the right fit by measuring the height and width of the body. This application provides interactive, rich and engaging surroundings to the clients.

Keywords: Virtual Try-On, Machine Learning, 2D Virtual Garments, Apparel, Virtual Trial Room.

I. INTRODUCTION

In stores usually, it takes more time to change the clothes or trying clothes. In online shopping, we cannot try clothes. In the proposed system we will try to upgrade the use of cloth in less time [8]. For this approach, we are going to create an environment that should be an effective room and which should be virtual [1]. For this system main issue should occur regarding adjustment according to the model of cloth with their ideal situation, plate, turning, spinning, and ordering [2]. The most important thing in this problem is removing user and their body parts [4]. In the literature, for the detection of parts of the user body, skeletal tracking and pose approximation there were many ways proposed. For online shopping users, using a web camera is going to be simple. To make the platform-independent approach and a portable approach we should implement this by using OpenCV and Python.

II. RELATED WORK

The current methodology of online searching doesn't guarantee the right size of the wear. This results in several products being returned and the time taken to replace it with the correct sized one is long. This is a major setback for the online shopping industry. The various approaches to obtain the desired results are as follows,

1) In the 2022 paper titled "High-Resolution Virtual Try-On with Misalignment and Occlusion-Handled Conditions" by Sangyun, Lee, Gyojung Gu, Seunghyun Park, Seunghwan Choi, and Jaegul Choo, the authors introduce a groundbreaking architecture designed for high-resolution virtual try-on experiences. The proposed system incorporates a unique approach, simultaneously executing the warping of clothes and the generation of segmentation, with these processes exchanging information seamlessly. Despite its innovation, the model has its limitations, notably relying on the assumption that test data is derived from the same distribution as the training data, a constraint present in existing image-based virtual try-on methods.

2) In the 2022 study titled "The Emperor's New Clothes: Self-Explorative Engagement in Virtual Try-On Service Experiences Positively Impacts Brand Outcomes" by Virginie Lavoye and Jenni Sipilä, the authors highlight the significance of Virtual Try-On (VTO) technology in offering fashion and beauty brands a platform to deliver enhanced self-explorative experiences to consumers. The research underscores the positive impact of such engagements on brand outcomes. However, it's important to note a limitation in the study, as the exploration focuses solely on styles through VTO, without delving into a deeper examination of the meaning associated with such exploration.
3) In their 2021 work titled “Style-Based Global Appearance Flow for Virtual Try-On,” Sen He, Yi-Zhe Song, and Tao Xian introduce an innovative method for virtual try-on by suggesting a style-based global appearance flow estimation technique to effectively warp garments. The key emphasis lies in enhancing the virtual try-on experience through this unique approach. However, it is essential to acknowledge a limitation, as the proposed method may encounter challenges in accurately predicting local fine-grained appearance flow under certain conditions.

4) In their 2021 paper “Style-Based Global Appearance Flow for Virtual Try-On,” Sen He, Yi-Zhe Song, and Tao Xian present a novel approach by introducing a style-based global appearance flow estimation method for warping garments in virtual try-on scenarios. This method is designed to enhance the overall virtual try-on experience by incorporating style considerations. However, a notable limitation of the proposed technique is its occasional inability to accurately predict the local fine-grained appearance flow, indicating potential challenges in capturing detailed nuances during the virtual try-on process.

5) In the 2021 paper titled “Style-Based Global Appearance Flow for Virtual Try-On” by Sen He, Yi-Zhe Song, and Tao Xian, the authors introduce a groundbreaking method employing style-based global appearance flow estimation for virtual try-on, enhancing the garment warping process. However, a notable limitation is identified, as the proposed method may encounter challenges in accurately predicting the local fine-grained appearance flow under certain conditions, indicating potential areas for refinement in capturing intricate details during virtual try-on experiences.

6) In their 2019 work titled “M2E-Try On Net: Fashion from Model to Everyone,” Zhonghua Wu, Guosheng Lin, Qingyi Tao, and Jianfei Cai introduce an innovative virtual try-on network, M2E-TON, designed to automatically transfer desired model clothes onto target person images. The key contribution lies in the automation of this process for a seamless virtual try-on experience. However, an acknowledged limitation of the method is its occasional failure, particularly in cases involving clothing items with head patterns, indicating a challenge in accurately handling such intricate details during the transfer process.

7) In 2019, Soltani, Zarzour, and Babahenini addressed the growing trend of online shopping by proposing a Smart Virtual Trial Room for the apparel industry. Their algorithm allows users to virtually try on selected dresses, considering the challenge of human silhouette adaptation in still images. However, the system lacks 3D viewing capability and is sensitive to varying light conditions.

8) In 2018, Han, Wu, and Yu developed VITON, an Image-based Virtual Try-on Network, specifically tailored for Madura batik dresses. The system aims to enhance customer engagement and boost sales by providing an efficient virtual dressing room experience. Despite its effectiveness, the limitation lies in the impact of lighting conditions on the depth map used in the process.

III. GAP ANALYSIS

In identifying gaps within the realm of virtual try-on technologies, several noteworthy concerns come to light. Firstly, the Smart Virtual Trial Room’s reliance solely on facial recognition poses a potential drawback, as it may limit its effectiveness in catering to users who prefer alternative identification methods or encounter issues with facial recognition. Additionally, the prevalent assumption in many virtual try-on approaches that test data aligns with the distribution of training data raises significant questions about their real-world performance, particularly when faced with distribution shifts. Furthermore, the challenges associated with fine-grained appearance flow prediction, as observed in methods like style-based global appearance flow estimation, pose obstacles in achieving accurate results during virtual try-on experiences, thus warranting a closer examination of methods to enhance overall quality.

IV. PROBLEM DEFINITION

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. Such images can be displayed, for example, in a magic mirror shopping application or games and movies. Current solutions involve the error-prone task of body pose tracking.
V. MODULE IDENTIFICATION

1. Hardware installation: Connect Raspberry to the camera and install the driver.
2. Image capture: capture images in real-time and send them to work.
3. Apply the Haar cascade algorithm for face detection.
4. Body sizing: Use face detection algorithms to process images and get the body size of the user.
5. Use the size to display clothes on user.

VI. PROPOSED SOLUTION

This project consists of developing an AR virtual fitting room application using augmented reality and computer vision technologies for smartphones. The proposed application is built on a web-based platform. Laptop camera is the main requirement to detect, recognize, and track human body movements to interact with the proposed application content such as virtual garments in real-time. The Graphical User Interface (GUI) of the application is designed as simple and easy to use to make it applicable to people in all age groups. The garment catalogue, garment details, and camera preview are the necessary and main user interfaces in this application. Therefore, the user interfaces have to be designed and built based on the heuristic principles which are easy to learn, effective, easy to remember, error-free, and pleasant to fulfil the usability criteria. In addition, the human body detection and motion tracking model is utilized to recognize and detect the human body skeleton joint positions in real time. The live video is passed to the model to get classification results. The process is shown in Figure 1. The available garments are also translated into the model to fit them to a human body in real-time according to detected body skeleton-based joints, body measurements, and garment measurements. In a nutshell, an AR virtual fitting room mobile application on Android mobile platforms is developed in integration with the human body detection and motion tracking model. Figure 2. Shows the system architecture that we will be using.
VII. CONCLUSION

Recent advancements in online shopping have enabled customers to purchase items anywhere and anytime. Although there are several advantages of online shopping, there is one huge problem that stops most people from shopping online, which is the inability to try things on, especially for clothing. On the other hand, clothing shopping may be tedious and troublesome for some in-store customers who do not wish to waste time in the fitting room. Both online and in-store customers wish to check whether the clothing fits in size and style in a more time-saving, efficient, and convenient way. Hence, this project aims to develop an AR virtual fitting room for customers to perform clothing fitting without physically trying it on the body. In this project, the AR virtual fitting room application is designed to be lightweight and efficient and can be run on inexpensive hardware which is a web-based app. Hence, users are allowed to experience AR and the body detection system by only installing the application instead of the whole system. In addition, the Graphical User Interface (GUI) of the application is simple and easy to use to make it applicable to people in all age groups. Users can get started with it quickly and easily. The human body is detected, recognized, and tracked using a camera to interact with the application content in real time. Pose estimation is implemented to detect human body skeleton joint positions so that body movements can be tracked over time. The body measurements can be obtained by calculating the distance between each of the skeleton joints detected. Then, the model of the garment is fitted to the human body based on the body skeleton joint positions, and body measurements as well as the garment measurements.

VIII. FUTURE WORK

For future plans, a recommendation system can be introduced to provide recommendations of clothing according to the user’s purchased history or wish list. The garments that users are most likely to purchase should be shown before the unlikely ones in order to enhance customer experience.

IX. REFERENCES


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