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Virtual Clothes Try-On

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Abstract

Virtual try-on of clothes is gaining popularity thanks to its commercial potential. It can be used for intelligent recommendation or online purchasing to reduce the selection to a few designs and sizes. Through this project we aim to create a mechanism that enables users to see themselves wearing virtual clothes while looking at a screen display, without taking off their actual clothes. We aim to stimulate the selected clothes on the captured image of the users, and they can see virtual clothes fitting on the image provided. The main drawback in the implementation of the previous works is that the change in pose of users may distort the clothes, which may lead to inaccurate results. In this project, we have implemented an image-based virtual cloth try-on model that can retain the texture and patterns of the clothing the user wishes to buy. This can be used to improve the experience of clients on e-commerce websites and other clothing industry portals and outlets.

Keywords: Virtual try-on, computer vision, augmented reality

INTRODUCTION

Online shopping is being preferred by consumers around the globe over conventional practices. Physically trying on clothing takes a lot of time, which is its biggest negative. Additionally, in order to select and purchase clothing, the consumer must go to the store in person. Further, it is not always true that the cloth ordered by customers through online platforms cover all the client needs. It is observed that in some cases customers face issues regarding the size, color, and the fitting of the dress. This leads to the return or exchange of the clothes. To avoid all these extra charges caused due to the unsatisfactory components related to shopping for clothes, a virtual try-on of clothes can be done. The virtual try-on of clothes is based on the idea that the user needs to click his image and select which cloth they want to try-on. Based on the input provided, the system will generate an image of the user with a selected piece of cloth superimposed on their body. The mechanism provided by Eisert and Hilsmann [1] proposes a dynamic method in which the real-time visualization of clothes is done on the user body by texture overlay method. They made use of segmentation method to retexture the shape of clothes. Another study presented by Joshi et al. [2] utilizes the user image with a specific dress on their body which helps the model in segmentation on the part of user body on which the cloth is to be fitted. These pictures in segmented forms are used at a later stage, which produces desired results. The system presented by Spanlang et al. [3] makes use of pre-generated human model that has the target clothing on it and later it is superimposed on the user body. Various other studies have also been done in this field with minor changes in each implementation. The common drawback of most of these models is that the

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results were unable to cope with the change in pose or the position of the user. The resulting images were losing texture and patterns over this specific part. Additionally, subpar parsing results still produce implausible outcomes when clothing textures are applied to the incorrect body portions. We have made an effort to get around this problem in our study. The pixel losing problem was one of the major problems in the implementation of the previous models. We have tried to minimize the pixel loss which is helping in more accurate results. The following additions to our study: (1) We have introduced an image-based virtual try-on network that provides rich quality results while provided with a set of inputs, (2) We have implemented a body-part geometric matcher module that can help with the problems like self-occlusion.

METHODOLOGY

The mechanism proposed in this study greatly improves accuracy and eliminates the issues faced in its predecessors like the pixel loss and the self-occlusion problem. We have used contextual data and geometric matching of images to deliver better results. To start with, we have implemented the user interface of the system with flask. The interface provides options for the user to select the user image and target clothing. Once the user clicks their image, this image is processed by different modules in the system. Further, the processed image is combined with the target clothing image as shown in Figure 1.

Context-Driven Virtual Try-on Network

Experimental context-based virtual networks rely on robust gesture matching and text synthesis for creating visually compelling virtual test results. The model is given an image of the user and the target clothing image as an input and the aim of the mechanism is to synthesize a result that consists of the user image in target clothing. We make use of two major components namely BPGM and CAG. The BPGM is an acronym for Body-Part Geometric Matcher, which helps in the process of warping of the target clothing in such a way that it best fits the user image. The second unit is Context-Aware Generator or CAG. This unit is responsible for creating the final results by combining the results from BPGM with user image. The brief details of these two components are as follows.

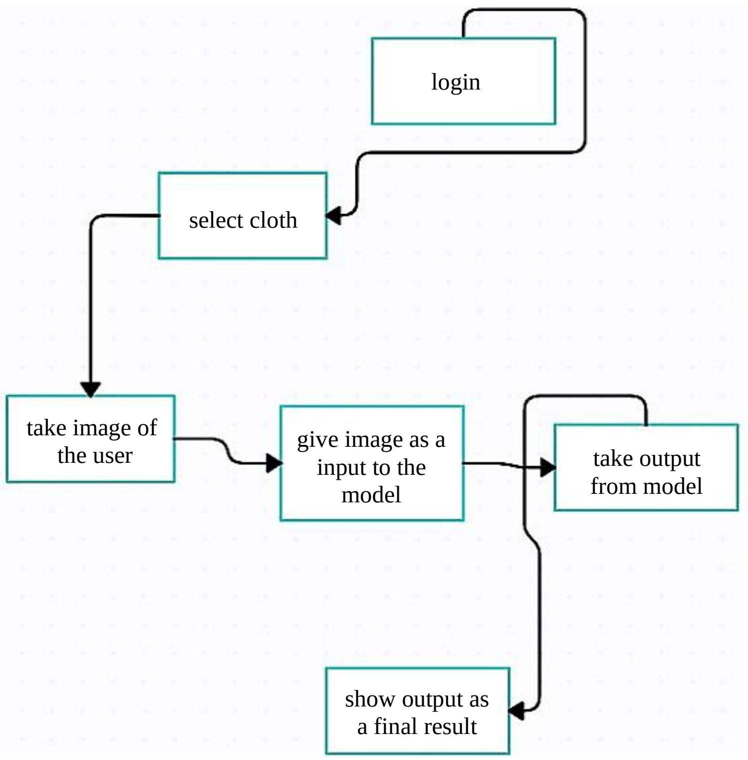

Figure 1. Block diagram of proposed system.

The Body-Part Geometric Matcher

This stage is responsible to create a rough skeleton of the target clothing which is chosen by the user to try-on. It is based on the transforming the parameters of thin-plate spline (TPS) [4], which is crucial in order to warp the target clothing in such a way that it can best fit the user image. The user image is aligned with the target clothing much effectively due to the use of BPGM unit. This allows the approximate alignment of the desired garment and helps to simplify the work of the generator in the next step. The user image is initially segmented in this stage. We generate the users body segments with help of DensePose model, which is borrowed from Güler et al. [5]. Each body part is classified into 25 distinct classes, which is the heart of the body-part segmentations module that provides reliable matching of target clothing to user image. The BPGM architecture follows the design of Geometric Matching Module (GMM) from Dong et al. [6] and consists of two distinct encoders E1 and E2. The first encoder is responsible for generating feature representation from the target clothing whereas second encoder second encoder takes the body segmentation in the form of input and generates final feature representation at output.

The Context-Aware Generator

Final results of the virtual try-on model are synthesized using the CAG module. This unit receives the warped image form the BPGM stage and other essential contextual cues as input. The CAG is made up of an array of ResNet blocks [7] and unsampling layers attached to it. Each ResNet block takes two parameters for input namely image context and activation map received from the preceding layer. Main application for this stage is to generate the final try-on results. This is done using output from the BPGM stage and working at a pixel level to overlay the warped image of clothing upon the user image. Various subcomponents are utilized for the working of this stage as shown in Figure 2.

Datasets

VITON [8] and MPV [9] are the two datasets used for this project. VITON is a popular dataset for evaluating virtual try-on solutions and it consists of 14,221 training and 2032 testing pairs of images (i.e., subjects and target clothing) with a resolution of 256 × 192 pixels. We have filtered the dataset by removing the duplicate and damaged images from the dataset. MPV is another virtual try-on dataset with 35,687 person images with a resolution of 256 × 192 pixels. The dataset consists of 13,524 unique garments.

RESULTS AND DISCUSSION

As depicted in the project screenshots in Figures 3 and 4, it can be seen that the proposed approach generates convincing virtual try-on results and performs better with graphics synthesis [10]. It is clearly visible that the results obtained using this system are acceptable with changing pose and different arm positions. Compared with similar implementations, our model provides much more accurate and acceptable results. The earlier models fail to preserve the pixels and textures from the original user image and target clothing sample. Major competitors like CP-VITON and ACGPN

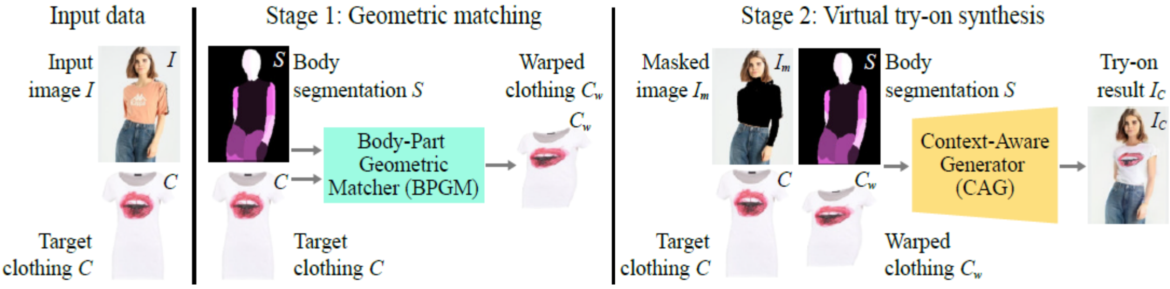

Figure 2. Overview of body-part geometric matcher (BPGM) and context-aware generator (CAG) functioning.

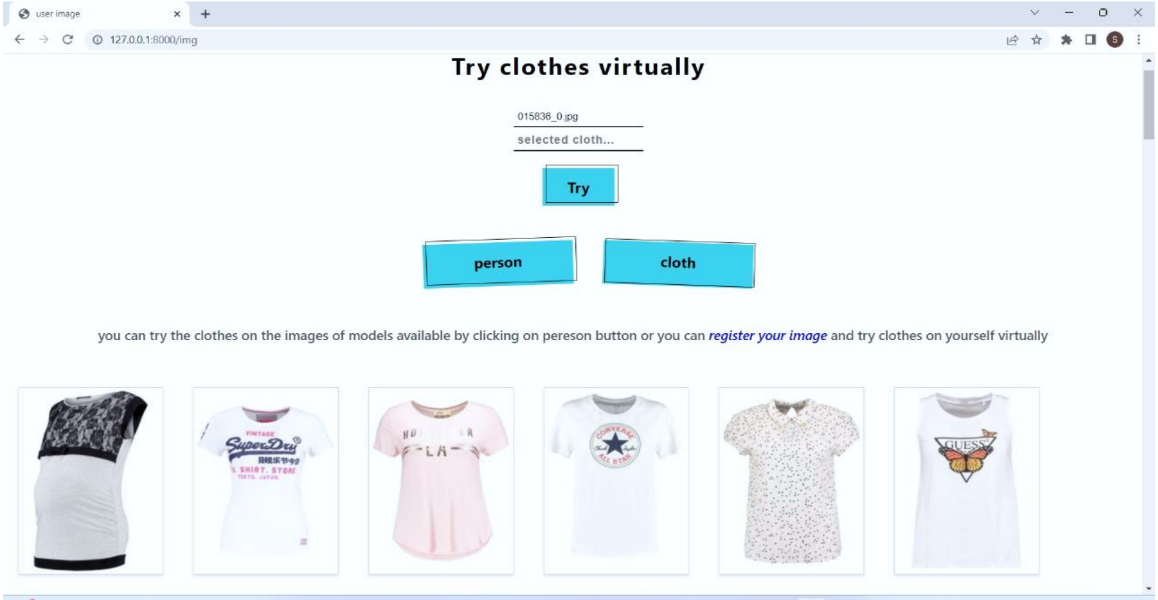

Figure 3. Virtual try-on results.

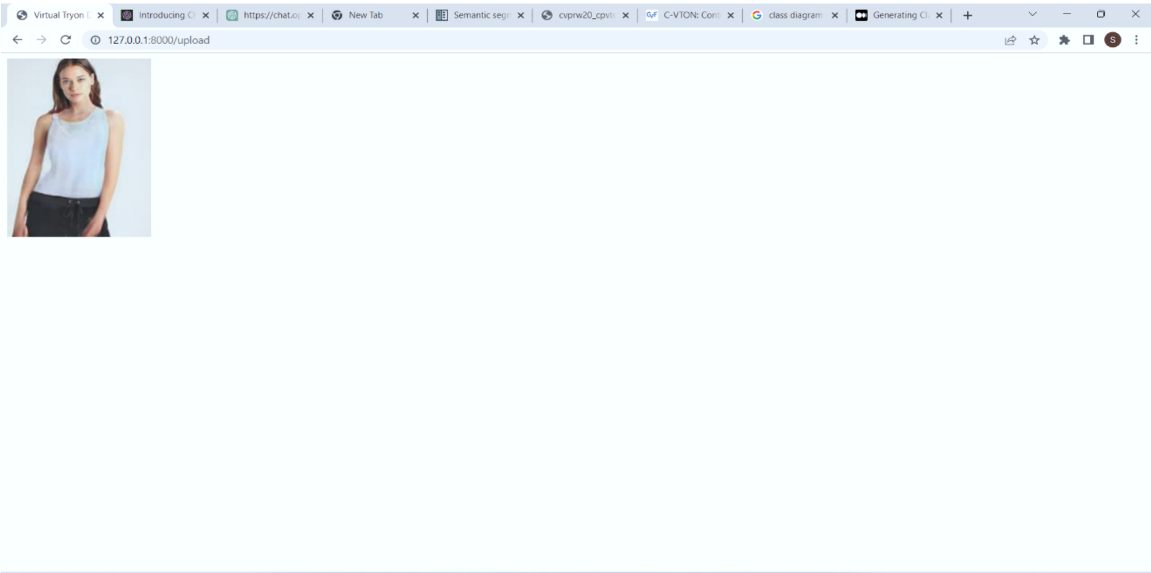

Figure 4. Final try-on result.

struggle to preserve the shape of body parts and preserve the skin tone [11]. Our model provides excellent performance in this regard thanks to the body-part segmentation used in the model. Further work in this field can be done by extending the image-based prototypes to real-time video-based models. Higher processing power and better training data are required for this kind of experiment. We can demonstrate this kind of system in the three-dimensional model, which depicts the body of the user. Also, similar kinds of models can be built for other products like jewelry, cosmetics, shoes, watches and other accessories.

CONCLUSION

This report has presented an augmented reality application in which users can select and try on virtual clothes. These clothes are rendered on a screen over the image of the user. The presented application is an improvement over similar existing augmented reality applications in that it offers the same functionality without any specialized hardware requirement. Using a three-stage design method, this project suggests a straightforward and practical virtual try-on model based on photos so that the texture in the fitting results may be accurately mapped in the context of intricate figure posture and background.

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