

# Virtual Try-On

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# Introduction

- There has been a **rapid growth in online shopping** and its technology.
- It all started with **augmented reality mirrors** and apps, reshaping the way beauty consumers discover and try on products in the past few years.



Figure: 1. Virtual Try-On Mirror

Source: Virtual Try-on mirror

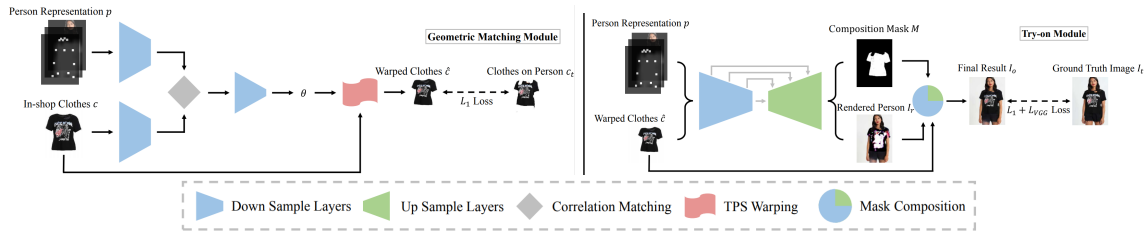
- Customers usually find it **confusing and difficult** to select appropriate style and suitable garment of their choice.
- Due to an **increase in online shopping** and the rental expenditure, offline stores have been tremendously threatened, mainly by this pandemic.
- Companies look for more **desirable way to attract people** be that online or in-store.
- Number of returns have also been increased because of **lack of try on** as they would have in offline shopping.

**Try before buying, from any location and save time.**

# Literature Survey

## Toward Characteristic-Preserving Image-based Virtual Try-On Network : (Wang et al. ECCV 2018)

Description: CP-VTON ((Wang et al., 2018)) is mainly composed of two modules. Namely, Geometric Matching Module and Try On Module.



**Figure: 2.** CP-VTON Architecture taking input in-shop cloth, warped cloth and person representation in its two modules GMM and TOM to generate output result.

# Literature Survey

## CP-VTON+: Clothing Shape and Texture Preserving Image-Based Virtual Try-On : (Minar et al. CVPRW 2020)

Description: CP-VTON+ ((Minar et al., 2020)) also consists of same modules as CP-VTON but both GMM and TOM modules are improvised in three aspects and folds respectively.

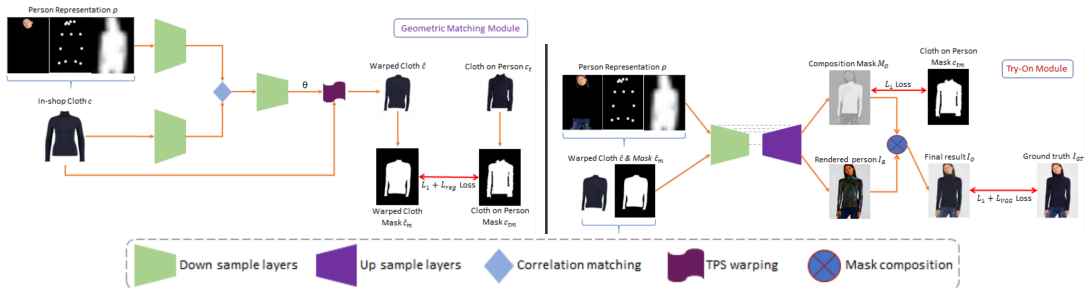
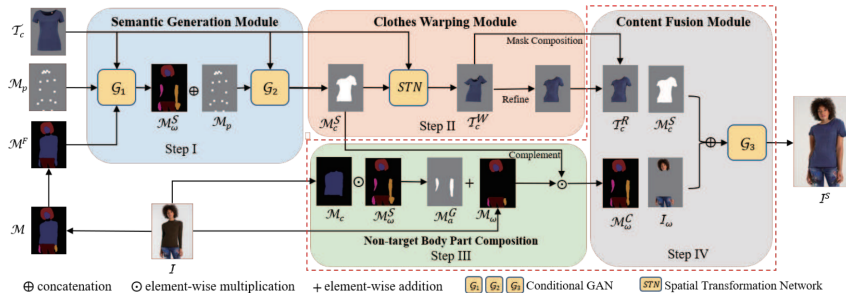


Figure: 3. CPVTON+ Architecture left side shows GMM and right side shows TOM module. We can see that loss is calculated in end of every module compared to CP-VTON yielding better results.

# Literature Survey

## Towards Photo-Realistic Virtual Try-On by Adaptively Generating↔Preserving Image Content : (CVPR 2020) Yang et al. ((2020))

Description: ACGPN ((Yang et al., 2020)) is composed of three modules namely, Semantic generation Module, Cloth Warping Module and Content Fusion.

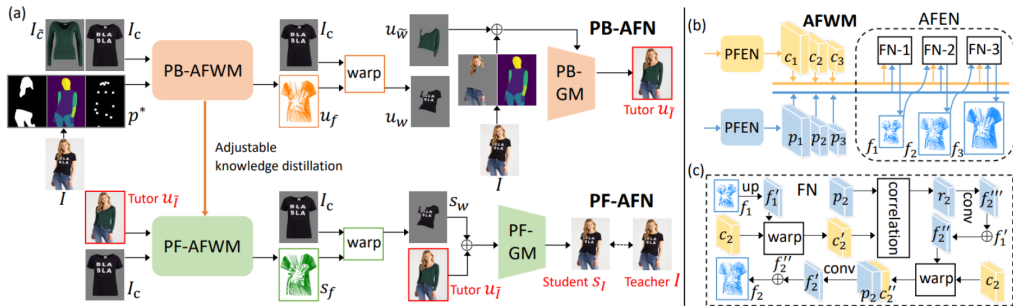


**Figure: 4.** ACGPN Pipeline. SGM takes the input of target cloth, pose map and fused body part mask. In CWM, second order differential constraint is used to stabilize warping process. The CFM generates result.

# Literature Survey

## Parser-Free Virtual Try-on via Distilling Appearance Flows : (Ge et al. CVPR 2021)

Description: PF-AFN ((Ge et al., 2021)) contains a parsed-based network and a parser-free network.



**Figure: 5.** The training pipeline of PF-AFN. Training image - Cloth and person image.  $p^*$  is obtained from person image to randomly select different cloth images to synthesize fake image  $U_I$  as tutor. Tutor and clothes image is fed as inputs to train PF-AFN to generate student  $S_I$  to be directly supervised by real image.



# Problem Statement and Objectives

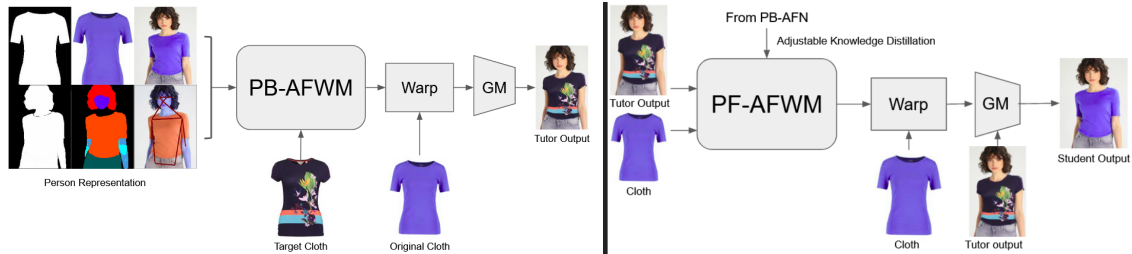
## Problem Statement

Design a end-to-end pipeline such that given a pair of target cloth and person image, generate an output image of the person wearing the target cloth.

## Objectives

- Achieve Virtual Try-On.
- Perform realistic rendering of clothes.

# Proposed Block Diagram



**Figure:** 6. Proposed Block Diagram for the project. PB-AFN on the left and PF-AFN on the right. Person representation and the cloth image are input to the PB-AFN. The output from the PB-AFN are input to the PF-AFN.

# Dataset Analysis / Description

- Detailed Explanation of **VITON**: Resolution: 256x192
  - 1 Total image pairs: 19000 (front view woman and top-clothing image pairs)
  - 2 Cleaned pairs : 16253
  - 3 Training set : 14221
  - 4 Validation set : 2032
- Sample images from dataset



Image



Keypoints



Image Mask



Image Parse



Cloth



Cloth Mask

# Experimental Results

## General Results



**Image**

**Cloth**

**PFAFN**

**CPVton+**

**ACGPN**

**Inference :** Cloth texture is retained in case of PF-AFN, and is not retained in CPVton+, while the cloth is not rendered correctly in ACGPN

# Experimental Results

## Simple Pose - Simple Cloth



Image

Cloth

PFAFN

CPVton+

ACGPN

**Inference :** Cloth texture and type is retained in case of PF-AFN, cloth type is not retained in CPVton+, while the cloth is rendered correctly but extra skin is generated in ACGPN.

# Experimental Results

## Simple Pose - Complex Cloth



Image

Cloth

PFAFN

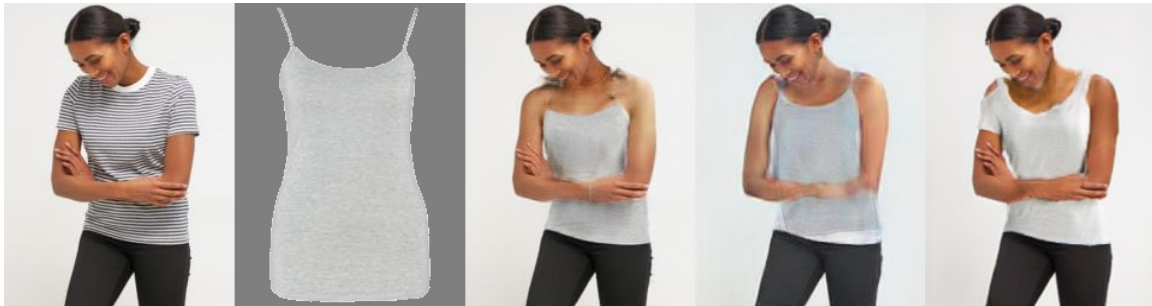
CPVton+

ACGPN

**Inference :** Cloth shape is retained in case of PF-AFN and CPVton+, while the cloth is not rendered correctly in ACGPN. The quality of CPVton+ is inferior compared to PF-AFN

# Experimental Results

## Complex Pose - Simple Cloth



**Image**

**Cloth**

**PFAFN**

**CPVton+**

**ACGPN**

**Inference :** Occlusion has been handled perfectly in PF-AFN and ACGPN, but the cloth shape is not retained in ACGPN.

# Experimental Results

## Complex Pose - Complex Cloth



**Image**



**Cloth**



**PFAFN**



**CPVton+**



**ACGPN**

**Inference :** Cloth does not fit the body in CP-Vton+, whereas cloth shape is not perfectly rendered in ACGPN



## Custom Image Verification



**Image**



**Cloth**



**PFAFN**



**CPVton+**

# Experimental Results



**Inference :** In a controlled environment the cloth is rendering correctly on a target custom image.

- **PF-AFN generates better results** than CP-VTON, CP-VTON+ and ACGPN.
- **CP-VTON+** also generates good results but has **challenges for complex clothes and poses**.
- **Controlled environment is a must.**

- Y. Ge, Y. Song, R. Zhang, C. Ge, W. Liu, and P. Luo. Parser-free virtual try-on via distilling appearance flows. *arXiv preprint arXiv:2103.04559*, 2021.
- M. Minar, T. Tuan, H. Ahn, P. Rosin, and Y. Lai. Cp-vton+: Clothing shape and texture preserving image-based virtual try-on. 2(3):11, 2020.
- B. Wang, H. Zheng, X. Liang, Y. Chen, L. Lin, and M. Yang. Toward characteristic-preserving image-based virtual try-on network. 2018.
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# Thank You