

# PolyGAN: MultiConditioned GAN For Fashion Synthesis

Project guide -Prof Priya S A

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# Introduction

Nowadays most people prefer buying clothes online only, as it is most convenient and also that can be done setting at home with just one click.

It allows seamlessly insert virtual objects in an image sequence .

In order to accomplish this goal,it is important that synthetic elements are rendered and aligned in an accurate and visually acceptable way.

The technic pose estimation is used to display garments on shopping sites.

This enables the buyers to choose from a variety of models after comparing the finish features and price of the products on display.



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# Problem Statement

Fashion Synthesis is a challenging task that requires placing a reference garment on a source model who is at an arbitrary pose and wears a different garment .

The arbitrary human pose requirement creates challenges, such as handling self occlusion or limited availability of training data, as the training dataset may or not have the model's desired pose.

# Literature Survey

1) Deepwrinkles: Accurate and realistic clothing modeling Z Lahner, D Cremers, T Tung Proceedings of the European conference on computer vision (ECCV) 2018

Reconstruct global shape deformations using a Statistical Model instead of physics based simulation and a mapping from pose parameters to Blend shape parameters using real-world data.

The major limitation is high resolution normal maps can have missing information in areas not seen by cameras, such as armpit areas

## Literature Survey(continued.....)

2)GarmentGAN: Photo-realistic Adversarial Fashion Transfer Amir Hossein Raffiee , Michael Sollami Salesforce Einstein 2020

The garment transfer problem comprises two tasks: learning to separate a person's body (pose, shape, color) from their clothing (garment type, shape, style) and then generating new images of the wearer dressed in arbitrary garments.

The limitation is, performance of the model in cases where the pose of the reference person is complicated, such as when arms and body occlude each other

# Existing System

Poly-GAN is the first instance where a common architecture is used to perform all three tasks(garment transformation,image stitching and in painting).

In this model generate garments with GAN conditioned on an arbitrary human pose and the same architecture is then trained to perform stitching and inpainting

The main benefit of the system is,this GAN architecture not only achieves state of the art results for Fashion Synthesis, but it is also suitable for many tasks. .

# Implementation

Platform-Google Colab

Language-Python

DataSet-DeepFashion

## Stages

The entire flow can be divided into 4 stages,

Stage1-The RGB pose skeleton is concatenated with the reference garment and then passed to the Poly-Gan.

The output of this stage is a newly generated garment which matches the shape and alignment of the RGB skeleton on which Poly-Gan an is conditioned.



# Implementation(Continued...)

Stage 2-The transformed garment from stage1 along with the segmented human body(without garment and without head) and the RGB skeleton are passed to the POLY-GAN .

This stage serves the purpose of stitching the garment from stage 1 to the segmented human body which has no garment.

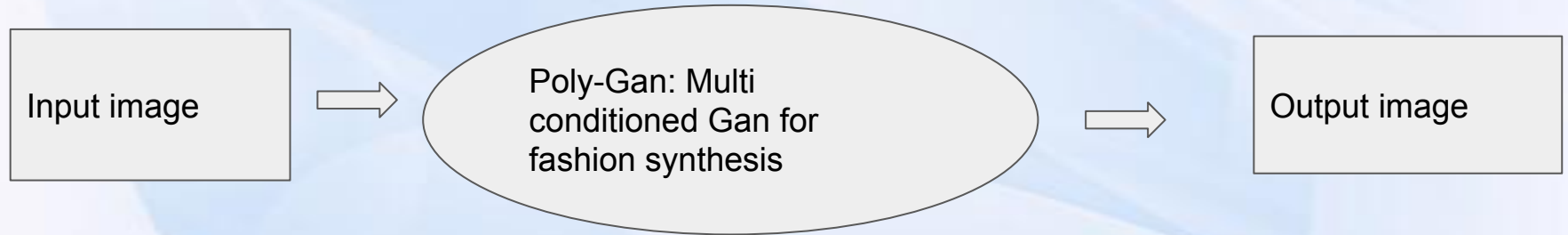
# Implementation(Continued...)

In stage 3 Poly-Gan learns to perform inpainting on irregular holes and refines the final result.

The last stage perform post processing by combining the results of stage 2 and stage 3 and stitching the head back on the body for the final result.

# Design

## Data Flow Diagram



# Result and Discussion

While placement of the garment on the model is very good but suffer from slight color shift in samples which is a common problem with GANs.

This limitation can be overcome by using a larger and more diverse dataset for training and train longer using larger number of epochs.

# Conclusion

Now a days all are switch to online shopping and hence this kind of model will be there to make the shopping more easier ,useful and in a efficient manner.

GAN is a powerful tool to make applications more impressive.

There are many innovative research directions that this method can offer.

This model suffer from color shift due to training the model with smaller number of epochs which slightly affect the performance(This can be avoid by training the model with large number of epochs).

## Future Work

This model can be extended to reconstruct all body parts with sufficient details without occlusions, and apply the method to more diverse types of clothing and accessories like coats, scarfs,footwears.

It can be extent to a virtual try on by using a scanning setup.

# Reference

1. Nilesh Pandey, Andreas Savakis, Poly-GAN: Multi-conditioned GAN for fashion synthesis, Neurocomputing, Volume 414, 2020,
2. Deepwrinkles: Accurate and realistic clothing modeling Z Lahner, D Cremers, T Tung Proceedings of the European conference on computer vision
- 3) GarmentGAN: Photo-realistic Adversarial Fashion Transfer Amir Hossein Raffiee , Michael Sollami Salesforce Einstein

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- 4) Cui, Y. R., Liu, Q., Gao, C. Y., & Su, Z. (2018, October). FashionGAN: Display your fashion design using Conditional Generative Adversarial Nets. In Computer Graphics Forum (Vol. 37, No. 7, pp. 109-119
- 5)Andriluka,M.,Pishchulin,L.,Gehler,P.,&Schiele,B.(2014).2D Human Pose Estimation: NewBenchmark and State of The Art Analysis. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (pp. 3686-3693).



# Thank You