3D Reconstruction of Clothes using a Human Body Model and its Application to Image-based Virtual Try-On

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3rd Workshop on Computer Vision for Fashion, Art and Design

Inherent limitations in image-based virtual try-on

Existing Methods

Try-on cloth

Target human

VITON (Warped & Final result)

Han et al. 2018
(VITON)

Inherent limitations in image-based virtual try-on

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Try-on cloth

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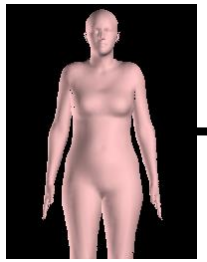
CP-VTON (Warped & Final result)

Wang et al. 2018
(CP-VTON)

Our Method

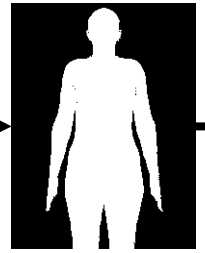
Try-on cloth	Target human	3D Cloth	3D warped	Try-on result

Pipeline



Reference 3D *SMPL* template

Rendering

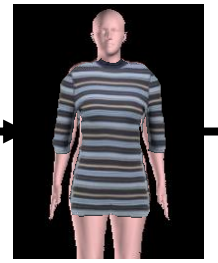


Try-on Cloth

1) 2D Cloth Matching

2D aligned cloth

2) 3D Cloth Reconstruction



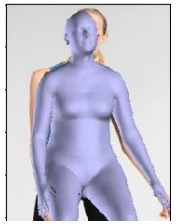
Target human

2D pose estimation

2D joints

SMPLify

3) 3D Pose & Shape Estimation



Pose, shape

4) 3D Shape transfer and Re-posing

3D Warped cloth

Try-on network

5) Blending

Try-on result

2D human segmentation

Segmentation mask

Dataset

VITON Dataset

Long-sleeve

Short-sleeve elbow

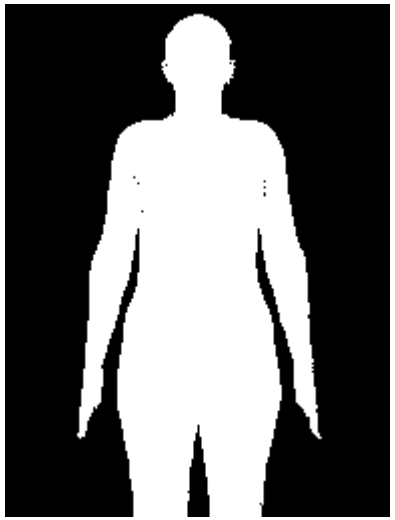
Short-sleeve half-elbow

Short-sleeve quarter-elbow

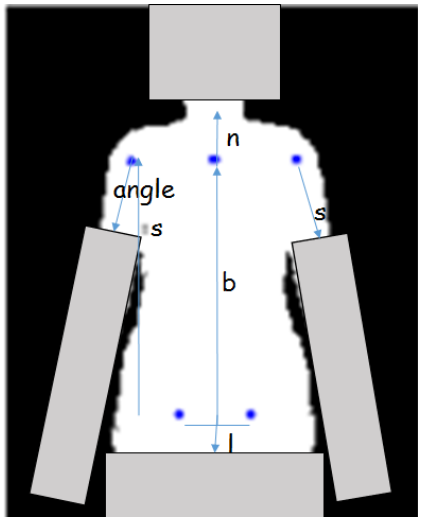
Sleeveless

Han et al. 2018
(VITON)

2D Cloth Matching



Reference SMPL body silhouette



Shape prototyping based on cloth category

Shape prototype/ Reference mask for matching

Try-on cloth

Shape-context matching + Thin-plate spline transform

2D overlaid cloth (matching)

2D matched Cloth output

Visual Flow

2D overlaid cloth

2D standard posed cloth vertices & texture

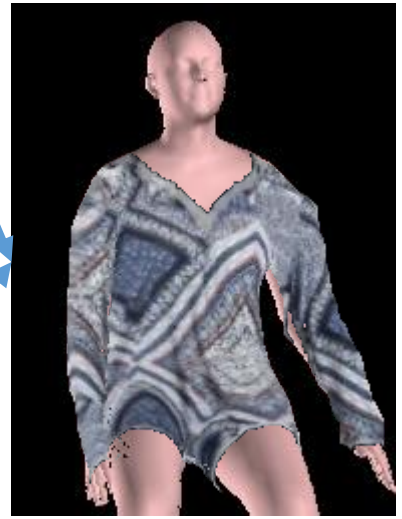
3D standard posed cloth vertices

2D matching to outer silhouette

Reconstructing 3D vertices model

Repose

3D posed cloth vertices



3D warped cloth

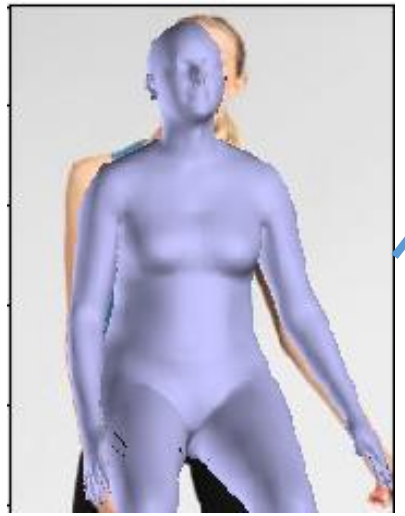
Rendering

Target human

3D Pose & Shape Estimation

SMPLify

3D pose & shape

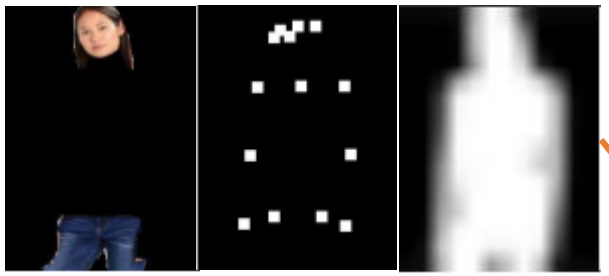


Minar et al. 2020
(CP-VTON+)

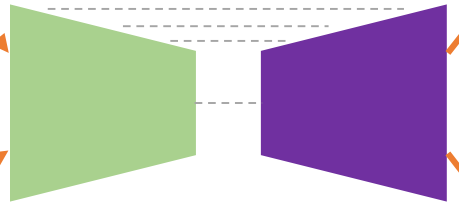
Blending

Try-on network

Person Representation p



Warped Cloth $\hat{c}$ & *Mask* $\hat{c}_m$

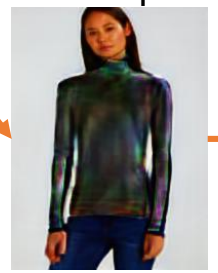


Composition Mask M_O

L_1 Loss

Cloth on Person Mask c_{tm}

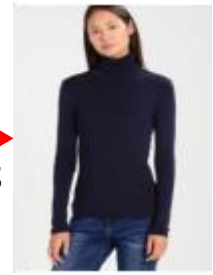
Rendered person I_R



Final result I_O

$L_1 + L_{VGG}$ Loss

Ground truth I_{GT}



Down sample layers

Up sample layers

Mask composition

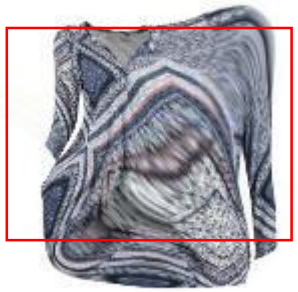
Qualitative

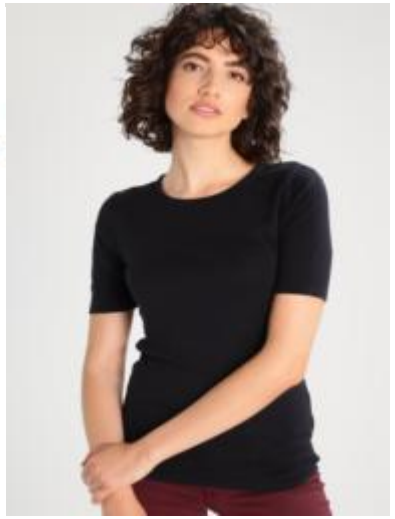
Try-on cloth

Target human

CP-VTON (Warped & Final)

Ours (Warped & Final)





Qualitative

Try-on cloth

Target human

CP-VTON (Warped & Final)

Ours (Warped & Final)

Conclusion

References

1. Loper et al. "*SMPL: A skinned multi-person linear model*." TOG, 2015.
2. Bogo et al. "*Keep it SMPL: Automatic estimation of 3D human pose an d shape from a single image*." ECCV, 2016.
3. Han et al. "*Viton: An image-based virtual try-on network*." CVPR. 2018
4. Wang et al. "*Toward characteristic-preserving image-based virtual try-on network*." ECCV, 2018.
5. Minar et al. "*CP-VTON+: Clothing Shape and Texture Preserving Image -Based Virtual Try-On*." CVPRW, 2020.