

Supplementary – DiffCloth: Diffusion Based Garment Synthesis and Manipulation via Structural Cross-modal Semantic Alignment

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In this supplementary material, we provide additional details of the implementation (Sec. 1) and the human evaluation (Sec. 2). Further, we include additional qualitative results of our method and illustrate its use in another novel application of 2D try-on as well as 3D try-on (Sec. 3). Given a sentence and a picture of a person, we generate an image of a person wearing the clothes that match the description. This can further improve and significantly impact the fashion design process.

1. Additional Implementation Details

While most of the implementation details have been described in the paper, we provide the remaining details here.

Dynamic thresholding for garment manipulation. This section provides further details on the dynamic thresholding p mentioned in Section 3.4. Given an attention map $M_i^j \in \mathbb{R}^{H \times W}$, we collect and sort its elements before selecting the 75th percentile pixel value as the threshold p , following the approach described in [3]. We then obtain a binary mask B_i^j by thresholding M_i^j with p :

$$B_i^j = \mathbb{I}[M_i^j \geq p], \quad (1)$$

where \mathbb{I} is the indicator function.

Training details. For the segmentor, we use PointRend [1] as our segmentation network, to obtain segmentation results of the noisy garments. During the segmentor’s training, we randomly select a timestep t between 0 to 1000 and add the corresponding noise to the training image.

As for the pretrained models, we loaded the parameters of stable diffusion [2] and then fine-tuned them on our data. The text encoder and image encoder architecture follows stable diffusion [2].

2. Human Evaluation Details

For the human evaluation, we designed three separate questionnaires that evaluate different aspects of our DiffCloth method and the baseline methods. Presented with results produced by all methods, the first questionnaire asks participants to indicate the synthesis result that had the least amount of garment part leakage. In the second questionnaire participants are asked to select the result with least attribute confusion. Finally, in the third questionnaire, we asked which method best fit the manipulation prompt without changing any other part. Each questionnaire consisted of 100 tasks, and the presentation order of the different methods was randomized. Before the start of the human evaluation, we invited five volunteers to complete the questionnaires in a thorough manner to test the required time for completion. During the evaluation, we invited 100 random volunteers for each questionnaire, and they were instructed to spend at least 6 seconds to complete each task in the questionnaire.

3. Additional Results and Application

Visual Results for garment synthesis: Fig. 1 displays additional generation results by DiffCloth on the CM-Fashion dataset.

Visual Results for garment manipulation: Fig. 2 displays additional manipulation results by DiffCloth on the CM-Fashion dataset.

Application to Virtual Try-On: Virtual try-on aims to transfer a given garment onto a person and is often necessary in fashion design to receive feedback on designs. To address this, we developed a simple application that generates 2D and 3D try-on results for a given person and a textual description of a garment. Specifically, our application utilizes DiffCloth to generate a matching garment and then leverages ACGPN [4] and M3Dvton [5] to provide 2D and 3D generation results, respectively. Figure 3 and Fig-

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ure 4 illustrate the try-on results generated by DiffCloth on the CM-Fashion dataset.

4. Potential Societal Impact

From a positive perspective, producing a garment that fits the description can have numerous advantages for the clothing design industry. It can lead to lower labor and material costs, while also providing designers with greater creative inspiration. However, it is important to implement measures that can prevent the misuse of this technology, such as copyright infringement and unethical practices like hiding trademarks during training.

References

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Prompt	DiffCloth	Prompt	DiffCloth	Prompt	DiffCloth	Prompt	DiffCloth
Dark grey cotton Polo Pony T-Shirt featuring jersey fleece,, crew neck, long sleeves and straight hem.		white cotton shirt featuring classic collar front button fastening short sleeves		Red Hapuna Trilobal swimsuit featuring a straight neck and a lining.		Blue shirt with horizontal stripe pattern, white polo collar, front button placket, long sleeves	
Black stretch-cotton high-rise straight jeans featuring belt loops, front button fastening,.		Blue cotton logo embroidered polo shirt featuring polo collar, front button placket and short sleeves.		A red silk pleated midi skirt featuring, back concealed zip and mid length		White cotton top featuring, V-neck, long sleeves, stretch-design and straight hem.	
Heather grey long-sleeve polo shirt featuring a classic polo collar, a front button placket and long sleeves.		Multicolor floral-print shirt featuring all-over floral print, drop shoulder and short sleeves.		Dusty yellow silk trousers featuring high-waisted, elasticated waistband and tapered leg.		Dark blue linen shirt featuring button-down collar, front button fastening, and long sleeves	

Figure 1. Additional results of garment synthesis on the CM-fashion dataset.












Source prompt	Input image	Text Query	DiffCloth	Source prompt	Input image	Text Query	DiffCloth
Light blue shirt featuring a classic collar, a front button fastening, long sleeves and button cuffs.		Change "Light blue shirt to "blue shirt"		Pink open back one piece featuring leopard print, scoop neck, spaghetti straps and open back.		Change "pink open back" to "pink leopard-print open back"	
Black wool jumper featuring a roll neck, long sleeves and straight hem .		Change "black wool jumper" to "pink wool jumper".		Stretch corduroy black trousers		Change "black trousers" to "Blue High Flare Jeans".	
Silver cotton long sleeve shirt featuring front button fastening, buttoned cuffs, classic collar,		Change "silver cotton long sleeve shirt" to "blue cotton short sleeve shirt"		Pale grey cotton short-sleeved T-shirt featuring round neck, logo print to the front, and short sleeves		Change "round neck" to "classic collar" and change "logo print" to "heart logo"	

Figure 2. Additional results of garment manipulation on the CM-fashion dataset.

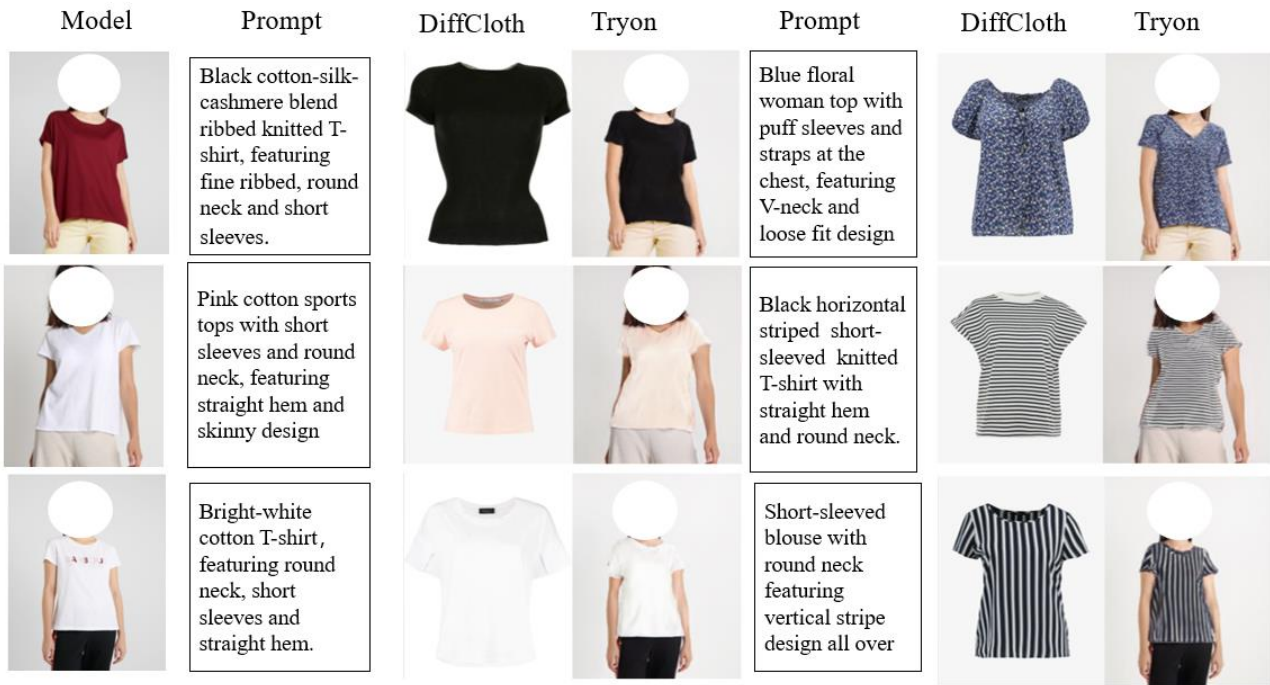


Figure 3. 2D try-on results for the garments generated by DiffCloth.

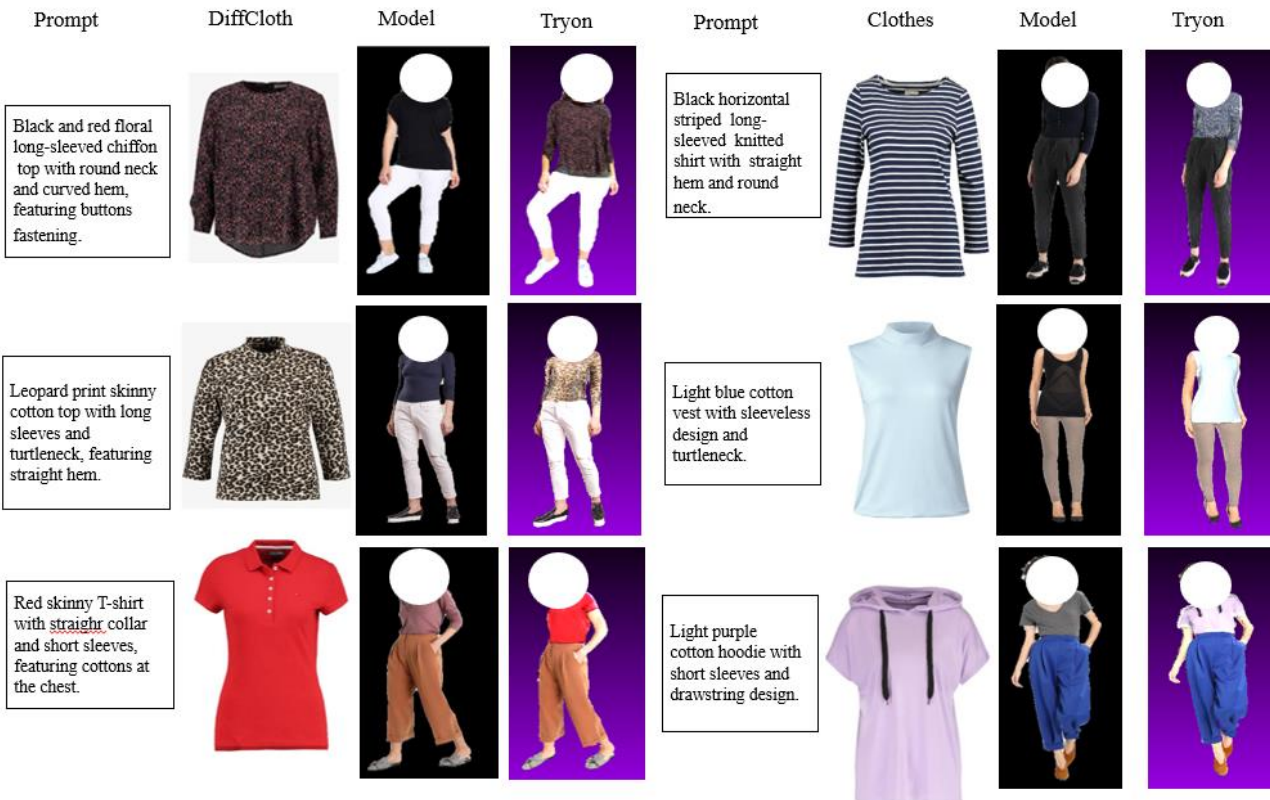


Figure 4. 3D try-on results for the garments generated by DiffCloth.