Exploiting Spatial Relation for Reducing Distortion in Style Transfer (Supplementary Materials)

Table 1. Quantitative evaluation between different stylization methods in terms of the style loss (\mathcal{L}_S) , content loss (\mathcal{L}_C) , and relation loss (\mathcal{L}_R) .

	Avatar-Net [6]	AAMS [7]	Ours (AdaIN)
$\log\left(\mathcal{L}_S\right)$	7.14	7.22	6.87
$\log\left(\mathcal{L}_C ight)$	0.50	0.52	0.41
$\log\left(\mathcal{L}_R\right)$	0.75	1.19	0.85

1. Effects of the relation loss

We conducted an ablation experiment to demonstrate the effect of the relation weight. As show in Fig 1, the spatial distortion in the stylization was decreased with the growing relation loss weight while the style loss weight and content loss weight are kept the same. It demonstrated that the proposed method can remdy the spatial distortion in style transfer.

2. More Results of Artistic Style Transfer

We provide more results of artistic style transfer for the comparison of the proposed method with other state-of-theart methods, including Neural Style Transfer [1], WCT [3], and AdaIN [2]. As shown in Fig. 2, the generated stylization results using the proposed method are more visually appealing. A high-resolution comparison is shown in Fig. 3.

3. Comparison with New State-of-the-art

We provide more results of artistic style transfer for the comparison of the proposed method with current state-of-the-art methods, including Avatar-net [6] and AAMS [7], in both qualitative and quantitative analysis. As shown in Fig. 4, the generated stylization results using the proposed method are more visually appealing. As indicated in Table 1, our method achieved the lowest style loss and content loss whereas Avatar-Net achieved the lowest relation loss.

4. More Results of Photorealistic Style Transfer

The results of photorealistic style transfer of the proposed method are compared with those of other state-of-theart methods, including Neural Style Transfer [1] and Deep Photo Style Transfer [5], as shown in Fig. 5. Another two high-resolution examples of photorealistic style transfer are shown in Figs. 6 and 7. The results of PhotoWCT [4] are also provided in these two figures. Note that Deep Photo [5] and PhotoWCT [4] utilize segmentation mask and affinityrelated information (loss function or smoothing procedure) to generate results of style transfer.

5. Leverage Segmentation Mask Back

Fig. 8 shows a case where the proposed method fails to transfer the pink color of the tree in the style photo to the content photo. This example suggests that the proposed method may fail to transfer styles between particular objects. Similar to the state-of-the-art methods [4, 5], however, the proposed method can leverage semantic label maps to improve stylization results. As shown in the bottom row of Fig. 8, the stylization results of the proposed method with segmentation masks are on par with those of the state-of-the-art methods [4, 5].

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Figure 1. The effect of relation loss weight. It demonstrated that the larger relation loss weight can reduce the spatial distortion.

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Figure 2. Artistic style transfer results of the proposed method in comparison with those of other state-of-the-art methods.



Figure 3. High-resolution results of artistic style transfer. Note that NST produces artifact (indicated by the red arrow), whereas our modified NST generates good results without this artifact.



Figure 4. Artistic style transfer results of the proposed method in comparison with current state-of-the-art methods.



Figure 5. Photorealistic style transfer results of the proposed method in comparison with those of other state-of-the-art methods.





content





Neural Style

Deep Photo



Photo WCT

Proposed

Figure 6. High-resolution results of photorealistic style transfer. Note that the proposed method can retain the structures of cloud and mountain without using segmentation masks.





style



Neural Style

Deep Photo



Photo WCT

Proposed

Figure 7. High-resolution results of photorealistic style transfer. Note that the proposed method can retain the structure of kitchenware without using segmentation masks, and the tone of the style transfer result matched that of the style image.



Masks

Deep Photo

PhotoWCT

Proposed + masks

Figure 8. Failure case. The proposed method fails to transfer the pink color of the tree. By leveraging segmentation masks, similar to Deep Photo Transfer [5] and PhotoWCT [4], the proposed method can successfully transfer patterns of particular objects.