


# Two-stage Photograph Cartoonization via Line Tracing –Supplemental Materials

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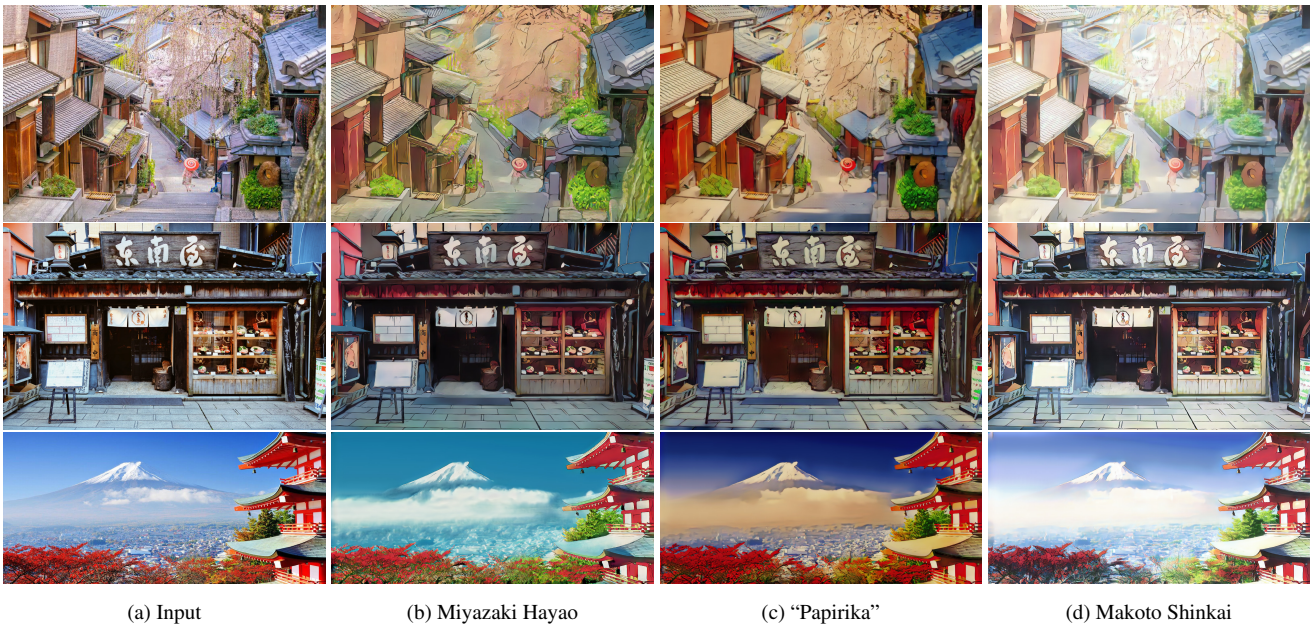


Figure 1: Stylistic comparison with three different artistic styles (best viewed when zoomed in).

## 1. Stylistic Comparison

More stylistic comparison results are shown in Fig. 1, where we convert the same real images to three different artistic styles. As can be seen, all of our results show abstracted shading and clear structural line drawing. The difference between different artistic styles mainly lies on edge intensity, color style and tone. Hayao style cartoonization results shown in Fig. 1b contain strong and sharp edges and bright colors, while “Papirika” (Fig. 1c) show a darker style and weaker edges than Hayao style. Results of Shinkai style shown in Fig. 1d show dreamy colors with the thinnest edges.

## 2. Ablation Study

We present more ablation study results here with respect to two losses, the structural reconstruction loss and style augmenting loss, which are the fundamental components for image transformation. Structural reconstruction loss is a pixel-wise difference loss to ensure image similarity, and therefore image transformation cannot achieve without this basic loss (see Fig. 2c). Style augmenting loss is a GAN loss that learns artistic style. Without this loss, our

method acts as a flattening method. By comparing with our final result in Fig. 2d, the results of removing the style augmenting loss shown in Fig. 2b fails to transfer artistic style.

## 3. Qualitative Comparison

We present more qualitative comparison results here, which are shown in Fig. 3, Fig. 4 and Fig. 5. Although CycleGAN [ZPIE17] captures the abstracted features of cartoon style well, it removes too much content details. CartoonGAN [CLL18] and its finetuned version are able to preserve edges well. However, both of them produce random abstraction and edges. More importantly, all competitors produce artifacts and erratic colors. In contrast, our proposed method involves flattening process that mitigates this problem. Our results contain artistic abstraction, shading and clear edges, preserving sufficient image details while without artifacts (best viewed when zoomed in).

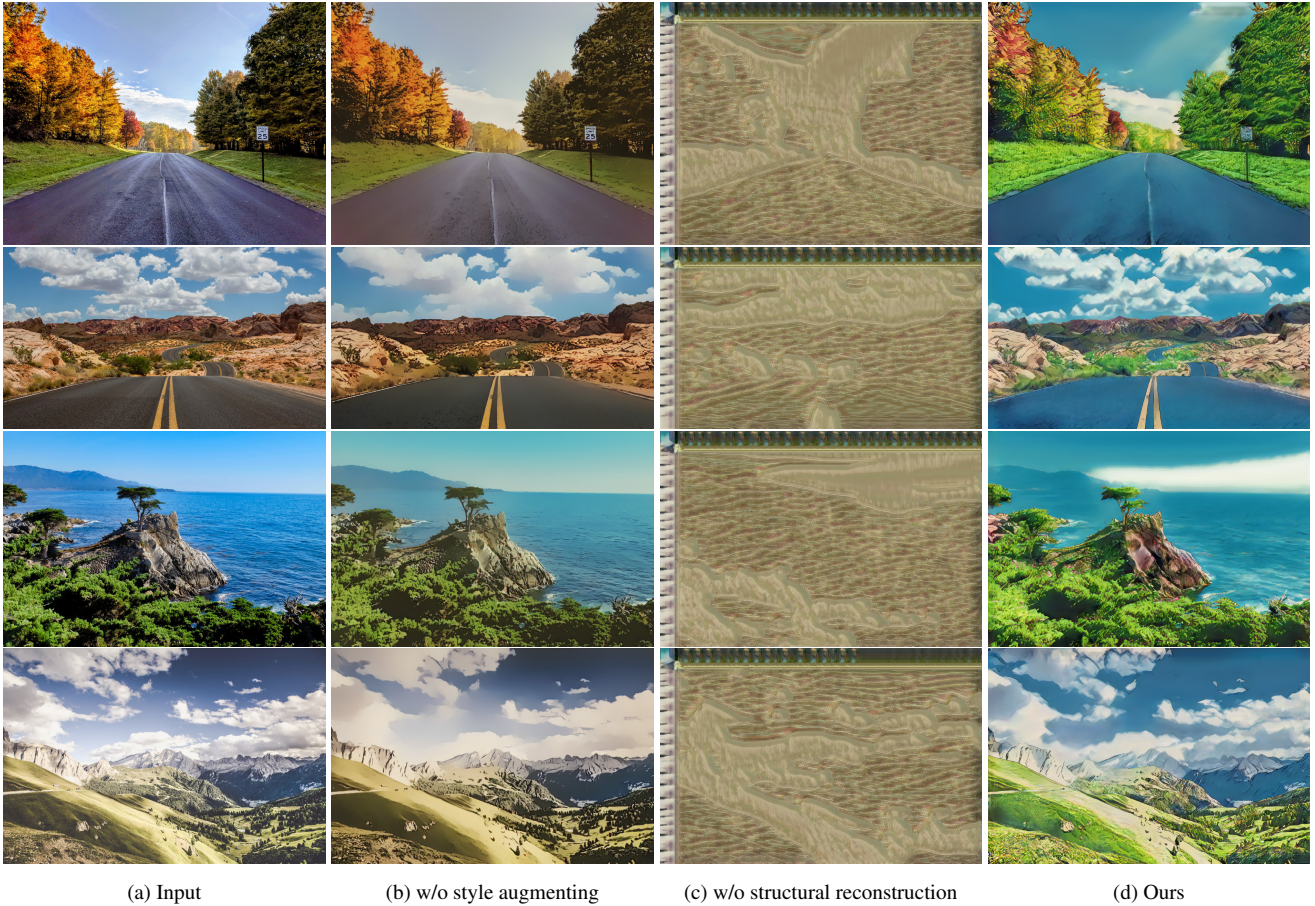


Figure 2: Ablation study with respect to style augmenting loss and structural reconstruction loss of our model (best viewed when zoomed in).

#### 4. High Resolution Cartoonization

More high resolution results are shown in Fig. 6 and Fig. 7. All of them produce artistic shading and edges without artifacts (best viewed when zoomed in). To find out cartoon details, we crop small images from original input and cartoonization results. It can be seen that buildings (e.g. roof, stone carving, tourists) show artistic abstraction, shading and clear edges. As for trees, the cartoonized results look like wash painting and the sense of art are improved.

#### References

- [CLL18] CHEN Y., LAI Y.-K., LIU Y.-J.: Cartoongan: Generative adversarial networks for photo cartoonization. In *CVPR* (2018), pp. 9465–9474. [1](#)
- [ZPIE17] ZHU J.-Y., PARK T., ISOLA P., EFROS A. A.: Unpaired image-to-image translation using cycle-consistent adversarial networks. In *CVPR* (2017), pp. 2223–2232. [1](#)



Figure 3: Qualitative comparison with state-of-the-art cartoonization methods with the Miyazaki Hayao style (best viewed when zoomed in).

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Figure 4: Qualitative comparison with state-of-the-art cartoonization methods with the “Paprika” style (best viewed when zoomed in).

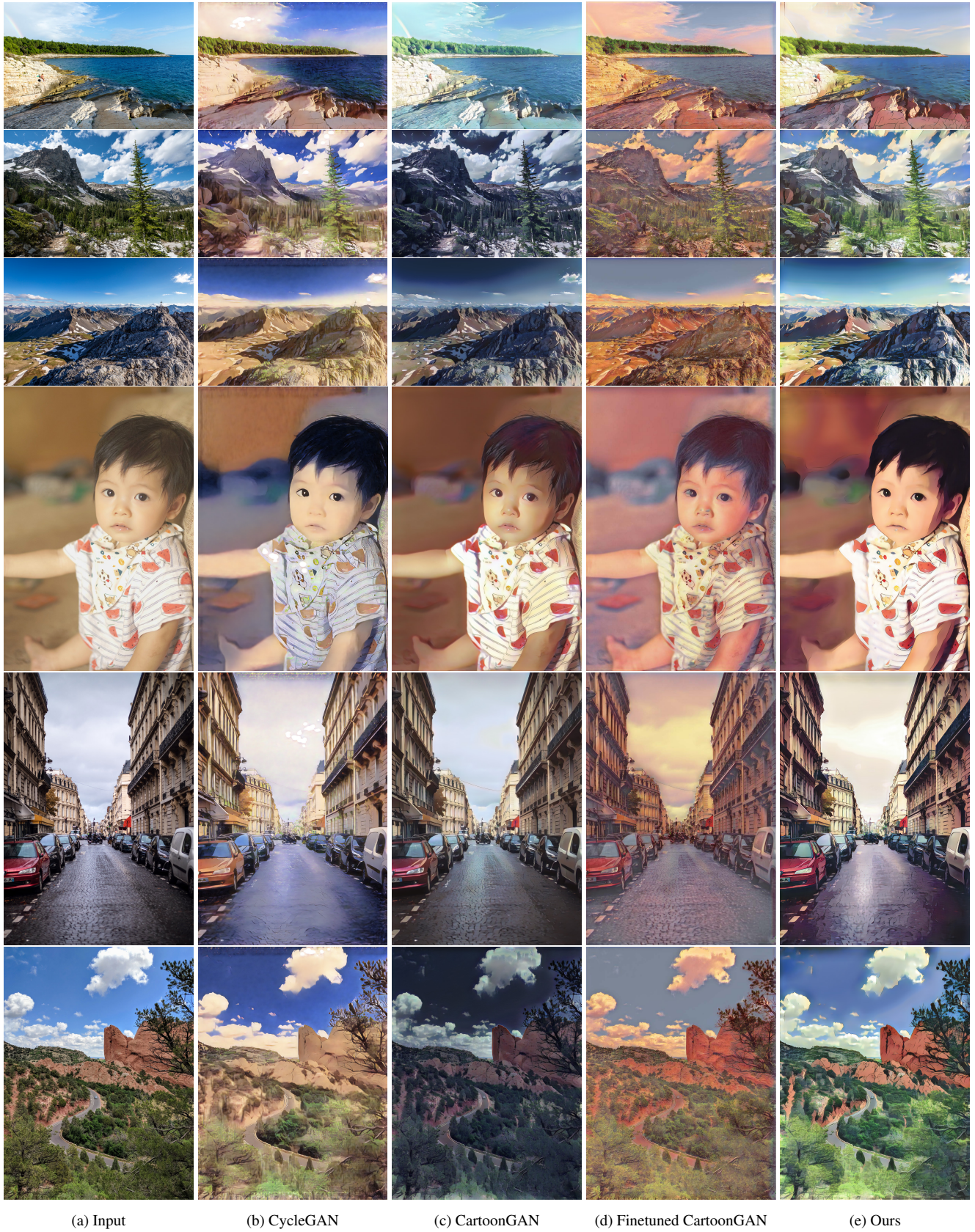


Figure 5: Qualitative comparison with state-of-the-art cartoonization methods with the Makoto Shinkai style (best viewed when zoomed in).



(a) Cartoonized result



(b) Input photograph



(c) Zoomed in

Figure 6: High resolution cartoonization result with the “Papirika” style (best viewed when zoomed in).



(a) Cartoonized result



(b) Input photograph



(c) Zoomed in

Figure 7: High resolution cartoonization result with the Makoto Shinkai style (best viewed when zoomed in).