Feature Proliferation — the "Cancer" in StyleGAN and its Treatments Supplementary Materials

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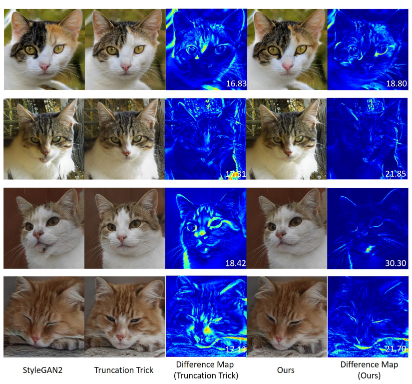
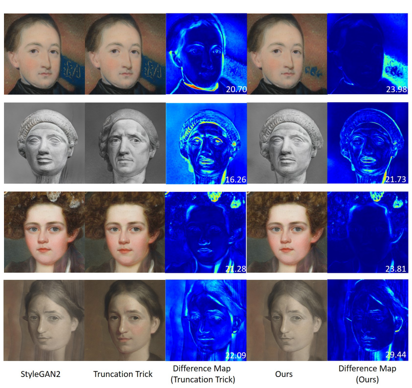
1. Additional Comparisons of Difference Maps

Fig. 1 shows additional comparisons of difference maps and PSNR scores of the truncation trick and our method on Cat and MetFace datasets. Our method is less destructive and better retains useful features in the generation.



(a) Cat



(b) Metface

Figure 1. Comparison of difference maps of truncation trick and our method over (a) AFHQ-Cat [1] and (b) MetFace [2] datasets. The numbers at the bottom right corner of the difference images are PSNR scores.

2. Choice of Hyper-parameters (Cont.)

In addition to Fig. 8 in Sec. 5.4 of the main paper, we provide additional qualitative justification for our choice of $p = 2, t = 2$ with FFHQ [3], MetFace [2] and AFHQ-Cat [1] datasets. As Fig. 2 shows, our choice of hyper-parameters is valid across different datasets.

3. Additional Results for Applications in Interpolation and Editing

Fig. 3 shows additional results for the application of our method in StyleGAN image interpolation. Our method can still remove image artifacts while retaining smooth StyleGAN interpolations. Fig. 4 shows similar observations for StyleGAN image editing. These results demonstrate that our method retains StyleGAN latent semantics and is compatible with various StyleGAN latent space applications.

4. Additional Statistics of Dominant Features

In addition to the statistics of dominant features in Fig. 4 of the main paper (*i.e.*, the η in red), we include more fine-grained results in Fig. 5, showing more details on how the ratio of dominant features increase across layers.

5. Results on Non-Face Data

Fig. 6 shows that our method works well on the Bench Dataset[1] without "face" structures.

References

[1] Yunjey Choi, Youngjung Uh, Jaejun Yoo, and Jung-Woo Ha. StarGAN v2: Diverse image synthesis for multiple domains. In *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, pages 8188–8197, 2020.

[2] Tero Karras, Miika Aittala, Janne Hellsten, Samuli Laine, Jaakko Lehtinen, and Timo Aila. Training generative adversarial networks with limited data. *Advances in Neural Information Processing Systems*, 33:12104–12114, 2020.

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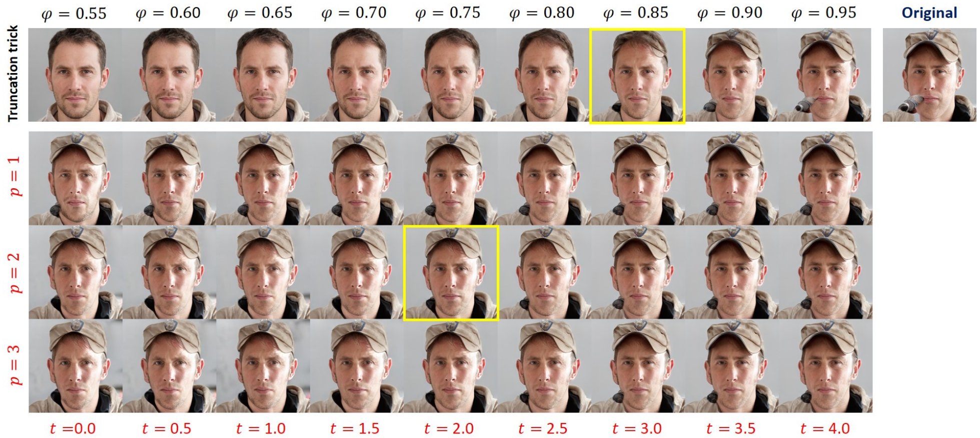
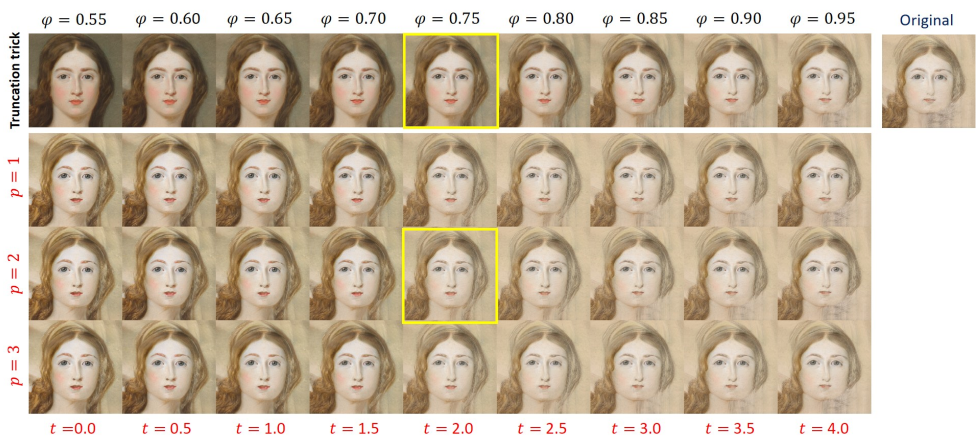
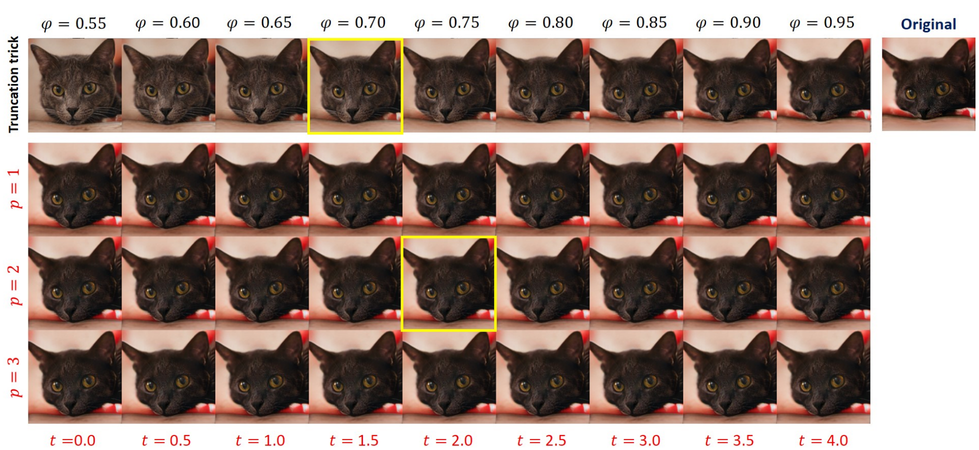
[1] https://github.com/justinpinkney/awesome-pretrained-stylegan3



(a)



(b)



(c)

Figure 2. Choice of hyper-parameters (Cont.). (a) FFHQ [3]; (b) MetFace [2]; and (c) AFHQ-Cat [1] datasets. For each subfigure, Top row: images generated with truncation trick with $\psi = 0.55$ to 0.95; Rows 2-4: images generated with our method with $t = 0.0$ to 4.0, $p = 1$ to 3. Our method removes the artifacts while retaining almost all important features of the original image, indicating that it achieves a better trade-off between image quality and diversity than the truncation trick.

Figure 3. Our method is compatible with StyleGAN interpolations. StyleGAN2: interpolation between defective images synthesized by StyleGAN2; Ours: images “corrected” by our feature rescaling method.

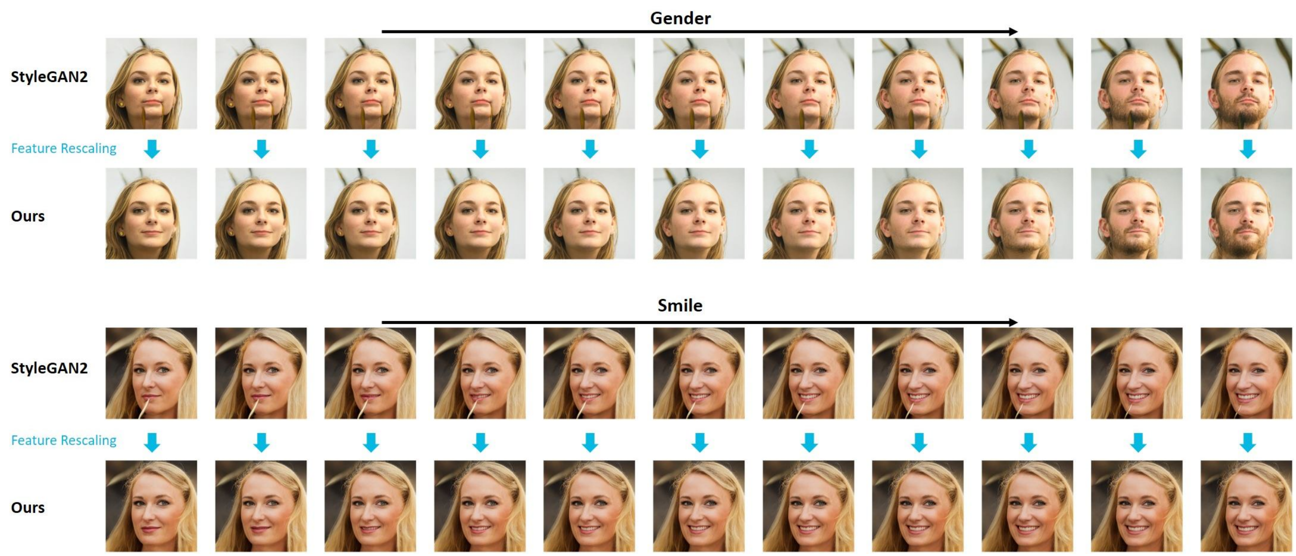


Figure 4. Our method is compatible with StyleGAN image editing [4], *e.g.*, gender, and smile. StyleGAN2: interpolation between defective images synthesized by StyleGAN2; Ours: images “corrected” by our feature rescaling method.

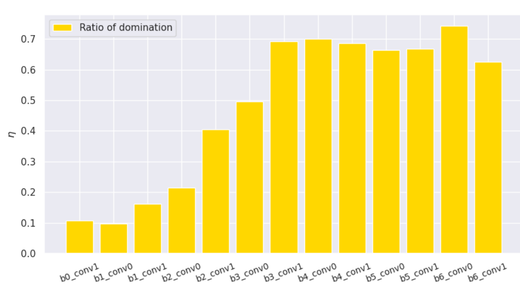


Figure 5. The ratio of dominant features η increases in different layers (from left to right) in a representative StyleGAN2 synthesized image affected by “cancer”.

[3] Tero Karras, Samuli Laine, and Timo Aila. A style-based generator architecture for generative adversarial networks. In *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, pages 4401–4410, 2019.

[4] Yuri Viazovetskyi, Vladimir Ivashkin, and Evgeny Kashin. Stylegan2 distillation for feed-forward image manipulation. In *Computer Vision–ECCV 2020: 16th European Conference, Glasgow, UK, August 23–28, 2020, Proceedings, Part XXII 16*, pages 170–186. Springer, 2020.

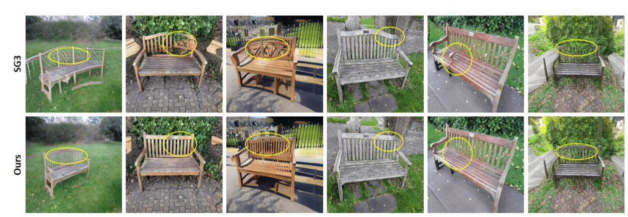


Figure 6. Results on the Bench dataset. SG3: StyleGAN3.