

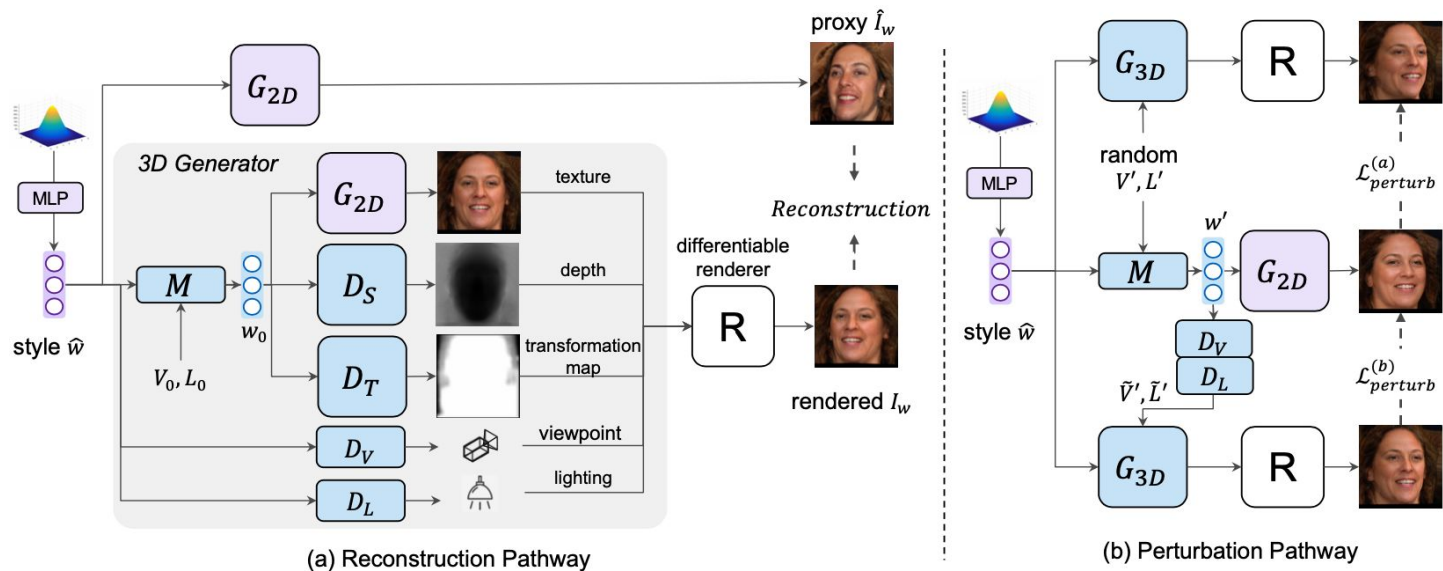
[Re] Lifting 2D StyleGAN for 3D-Aware Face Generation

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Scope Of Reproducibility

- Reproduce all of the qualitative and quantitative results of LiftedGAN.
- Further extending the experiments presented in the original work.

Methodology



Overview of LiftedGAN architecture. The purple blocks indicate the modules from the pre-trained StyleGAN2, which are not updated during training. The blue blocks are the modules to be trained. Obtained from the original paper.

Methodology Continued

The overall loss function for the 3D generator used in the reconstruction pathway:

$$L_{G_{3D}} = \lambda_{rec}L_{rec} + \lambda_{flip}L_{flip} + \lambda_{perturb}L_{perturb} + \lambda_{idt}L_{idt} + \lambda_{reg_A}L_{reg_A}$$

Table 1. Objective function coefficients

Dataset Name	λ_{rec}	λ_{perc}	λ_{flip}	$\lambda_{perturb}$	β	$\lambda_{LV_{cyc}}$	λ_{idt}	λ_{reg_A}
FFHQ	5.0	1.0	0.8	2.0	0.5	2.0	1.0	0.01
AFHQ Cat	5.0	1.0	0.8	2.0	4.0	0.0	1.0	0.005
CelebA	5.0	1.0	0.8	2.0	0.5	2.0	1.0	0.01

Methodology Continued

Table 2. Dataset details

Dataset Name	Sample Size	Image Dimension	Training Dimension
FFHQ	70,000	1024×1024	256×256
AFHQ Cat	5,000	512×512	256×256
CelebA	202,599	178×218	256×256

FFHQ and AFHQ Cat datasets are used in the original work. In addition we also used CelebA to validate the generalizability of the original work.

Results Reproducing the Original Work (Qualitative Results)



Face generation example on FFHQ. The first row is the results produced by the original weights, the second row is the results produced by our reproduced weights.



Changing the direction of the light source on FFHQ. The first row shows the results produced by the original weights, and the second row presents the results produced by our reproduced weights.

Results Reproducing the Original Work (Qualitative Results)



(a) Original



(b) Reproduced



(a) Original

(b) Original



(c) Reproduced

(d) Reproduced

Results Reproducing the Original Work (Quantitative Results)

Table 3. Original and reproduced FID scores.

Experiment Name	Dataset	FID (Reprod.)	FID (Orig.)
LiftedGAN <i>wo_flip</i>	FFHQ	15.50	28.69
LiftedGAN <i>wo_perturb</i>	FFHQ	19.78	21.3
LiftedGAN <i>wo_idt</i>	FFHQ	24.44	30.63
LiftedGAN <i>wo_rega</i>	FFHQ	24.28	27.34
LiftedGAN	FFHQ	25.54	29.81

Reproduced results of the ablation study in the original work.

Results beyond the Original Work

The qualitative results on CelebA dataset. Rows:

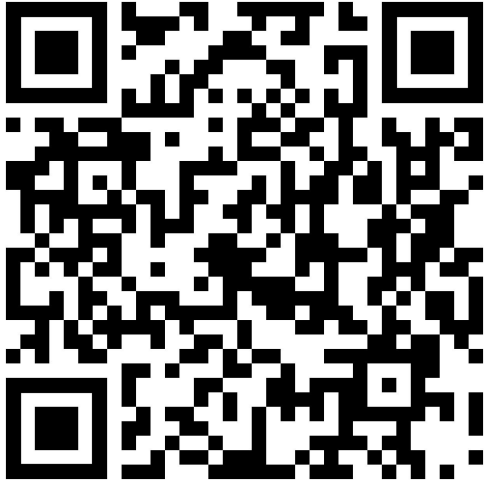
1. Face generation
2. Rotation on yaw axis
3. Rotation on pitch axis
4. Light direction



Discussion

- Although there are a few missing implementation details in the paper and a few missing evaluation scripts in the official repository, we were able to reproduce the results reported in the original work on a large scale.
- Overall, we were able to obtain similar qualitative results when compared to the original work.

Thank You for Your Time



Report



Project Repository

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