



Poster Session
WED-AM-034

Fine-Grained Face Swapping via Regional GAN Inversion

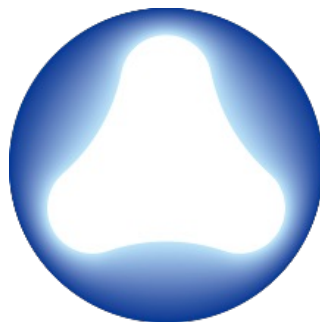
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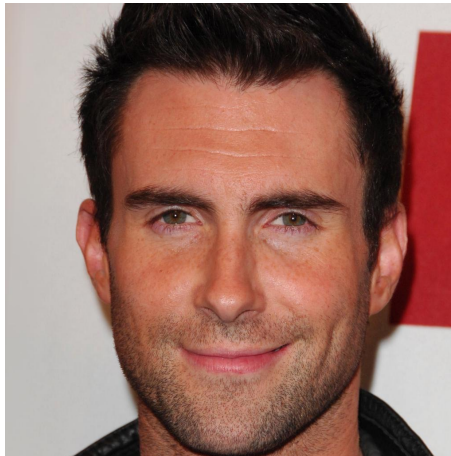
²Tencent AI Lab

³Tsinghua Shenzhen Graduate Schoole

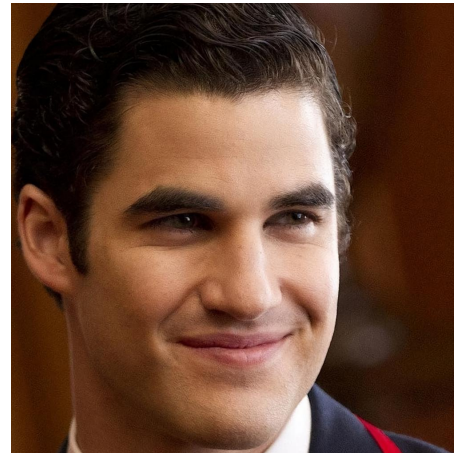


Face Swapping

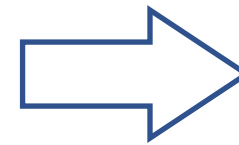
- Goal
 - Transfer the identity of a source face to the target
 - Preserve the identity-irrelevant attributes from the target



Source



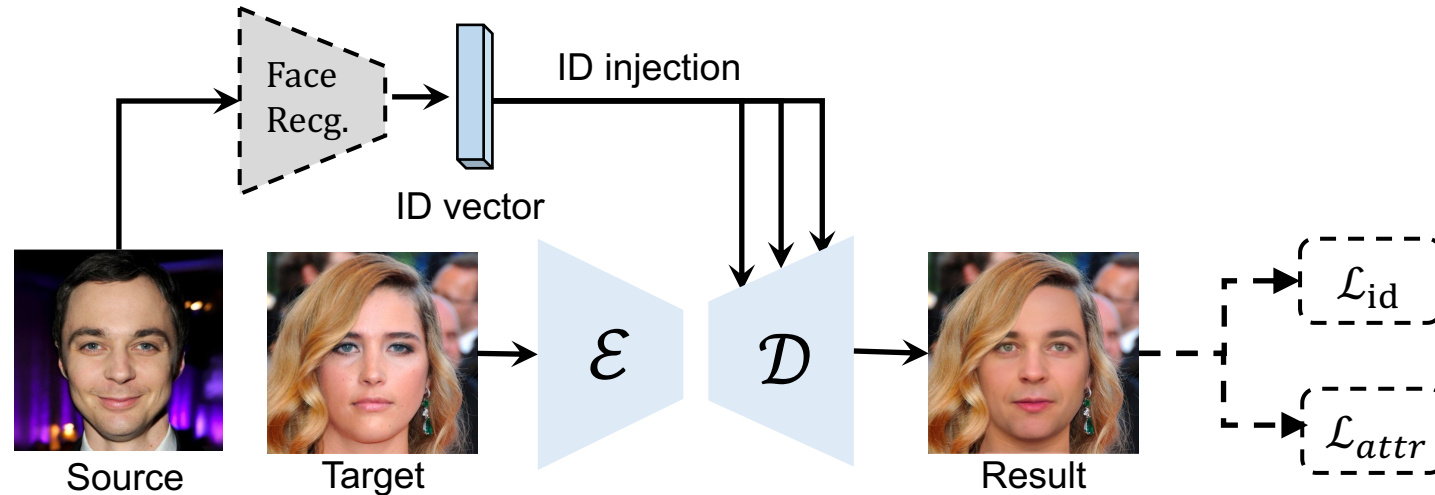
Target



Swapped Face

🤔 Motivation

- Popular approaches
 - Face recog. model for ID vector, then inject into the decoder^[1, 2]. But recog. model is for classification rather than generation, i.e., task domain gap



- Extra sub-network to handle occlusion^[1, 3]

[1] Li et al., FaceShifter: Towards High Fidelity And Occlusion Aware Face Swapping, CVPR 2020

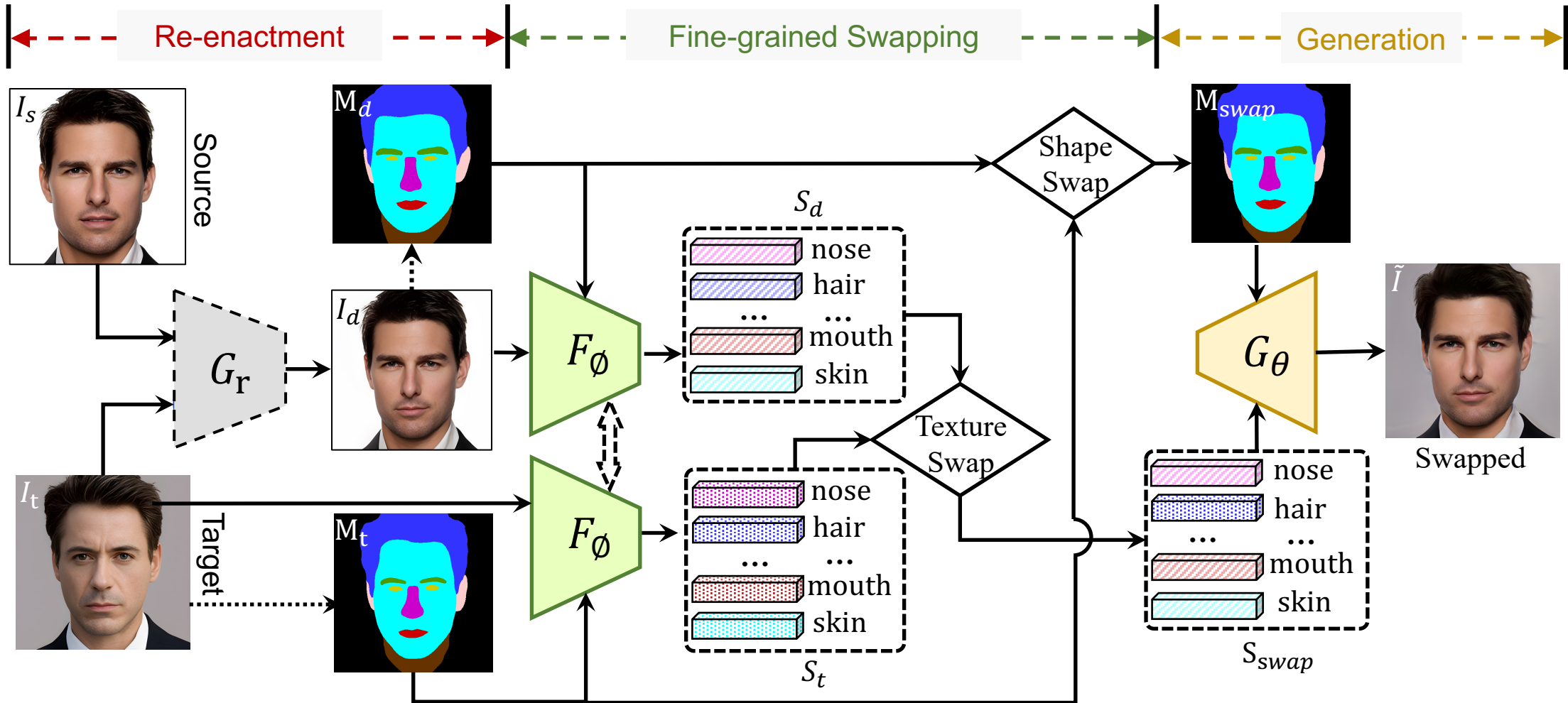
[2] Wang et al., Hiface: 3D Shape and Semantic Prior Guided High Fidelity Face Swapping, IJCAI 2021

[3] Nirkin et al, FSGANv2: FSGANv2: Improved Subject Agnostic Face Swapping and Reenactment, arXiv 2022

Our Contributions

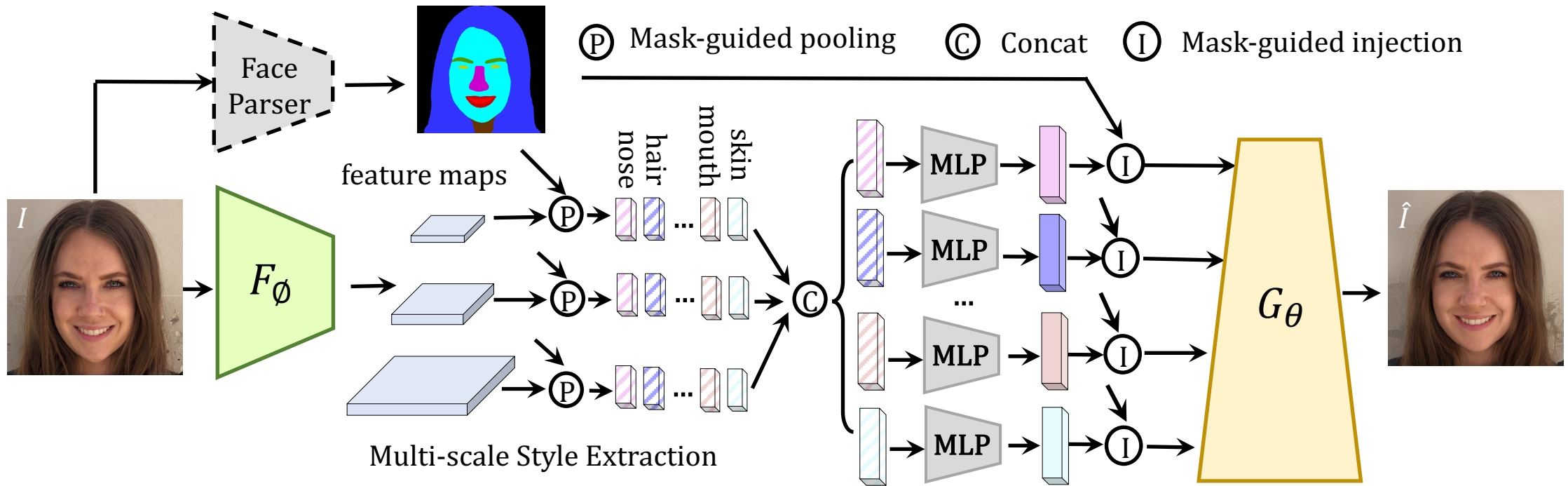
- Rethink face swapping from a new perspective of fine-grained face editing, i.e., explicit swapping for each facial component.
- Design a Regional GAN Inversion (RGI) network to disentangle shape & texture for each facial region.
- Extensive experiments on face swapping, face editing & extension tasks.

Method



Method

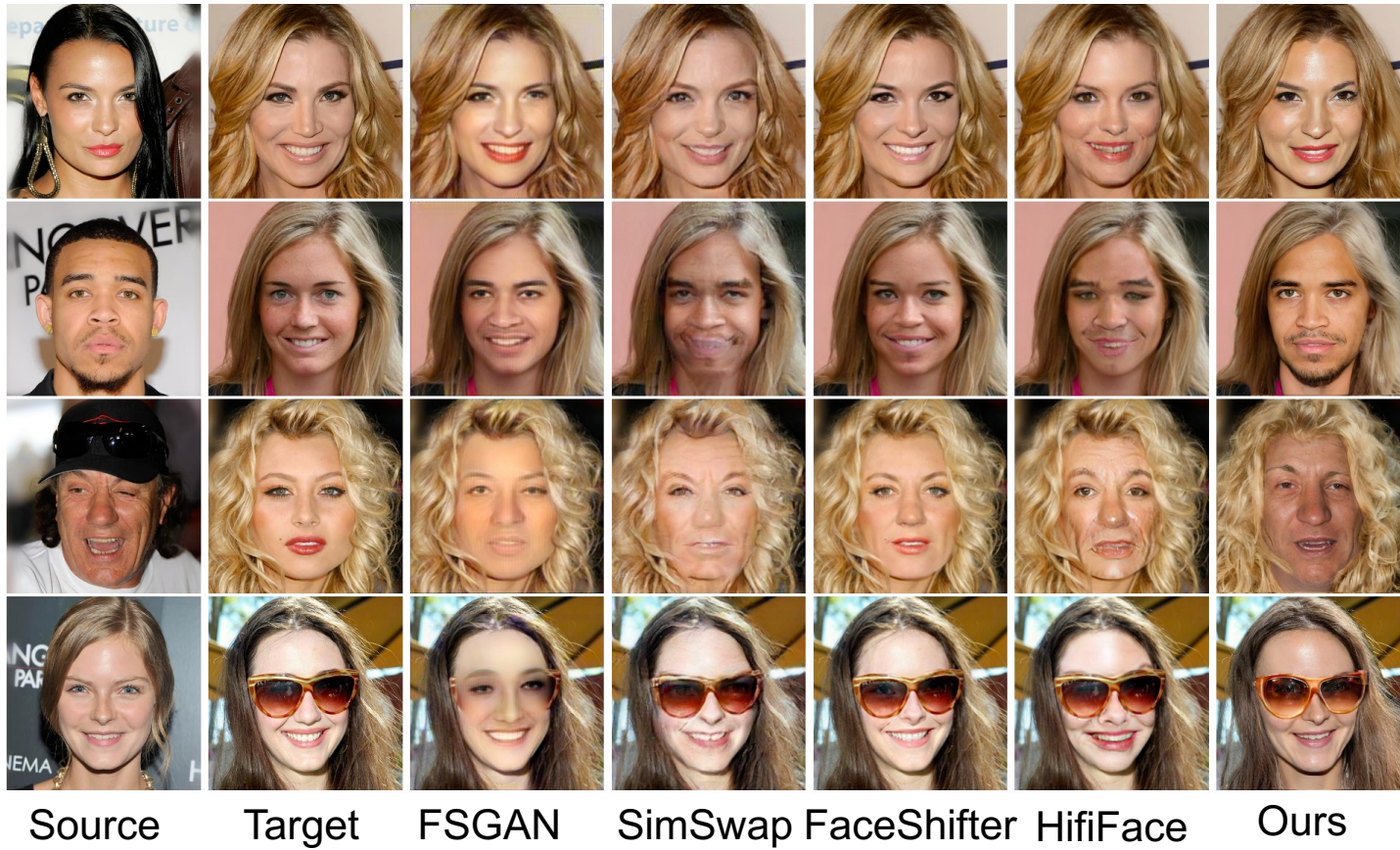
- Regional GAN Inversion, $RGI = F_{\phi} + G_{\theta}$



🌟 Only single-image reconstruction for the training!

Results

- Face Swapping



- Random 500 source-target pairs

Method	ID retrieval \uparrow		Pose \downarrow	Expr. \downarrow
	Top-1	Top-5		
FSGAN \dagger [25]	0.17	0.32	2.33	2.45
SimSwap \ddagger [9]	0.12	0.32	2.89	2.84
FaceShifter \ddagger [24]	0.06	0.26	1.73	2.35
HiFiFace \ddagger [38]	0.15	0.37	2.77	2.82
MegaFS * [48]	0.29	0.45	3.03	3.05
StyleFusion * [15]	0.35	0.18	5.37	2.94
HiRes \ddagger * [41]	0.05	0.51	2.71	2.83
Ours \dagger *	0.38	0.54	3.29	3.05

- Better identity preservation
- Competitive pose & expression keeping, finding a identity-attribute trade-off

Results

- Face Swapping in HQ



Src/Trgt

MegaFS

StyleFusion

HiRes

Ours

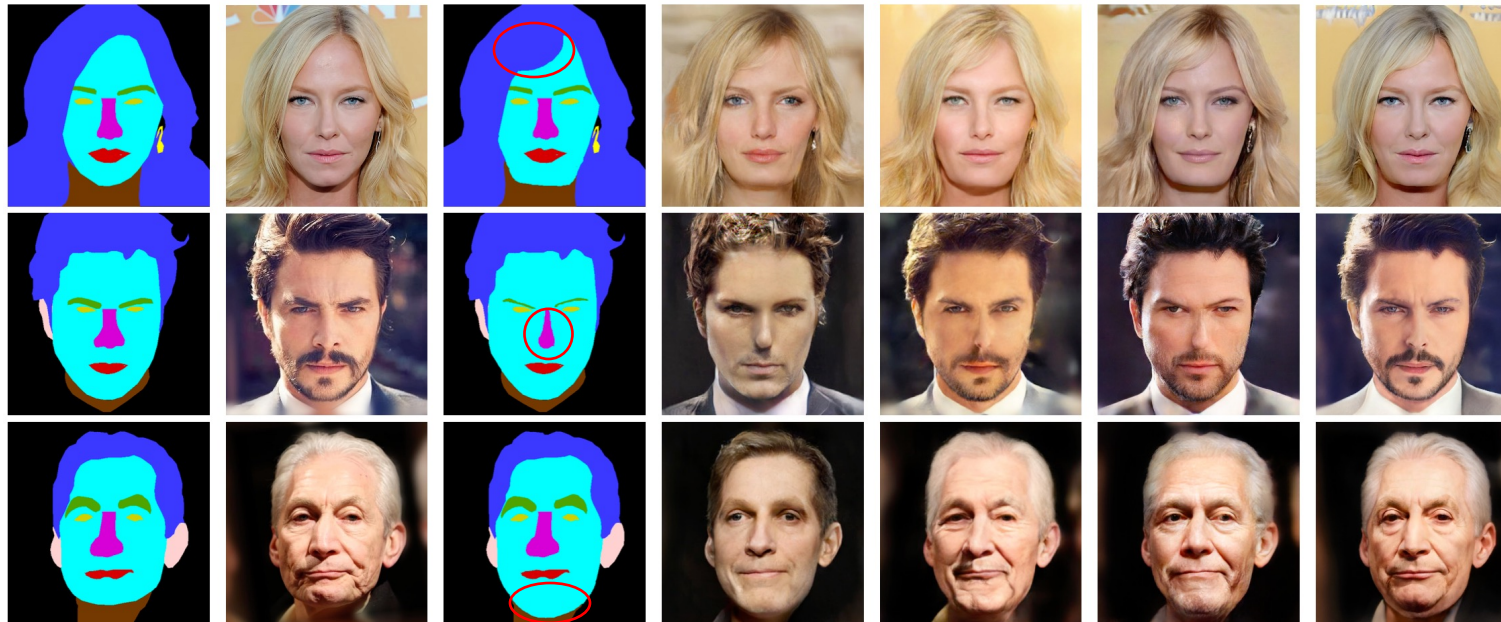
Results

- Face Swapping in video



Results

- Face Editing



Original mask

Original image

Edited mask

SPADE

SEAN

MaskGAN

Ours

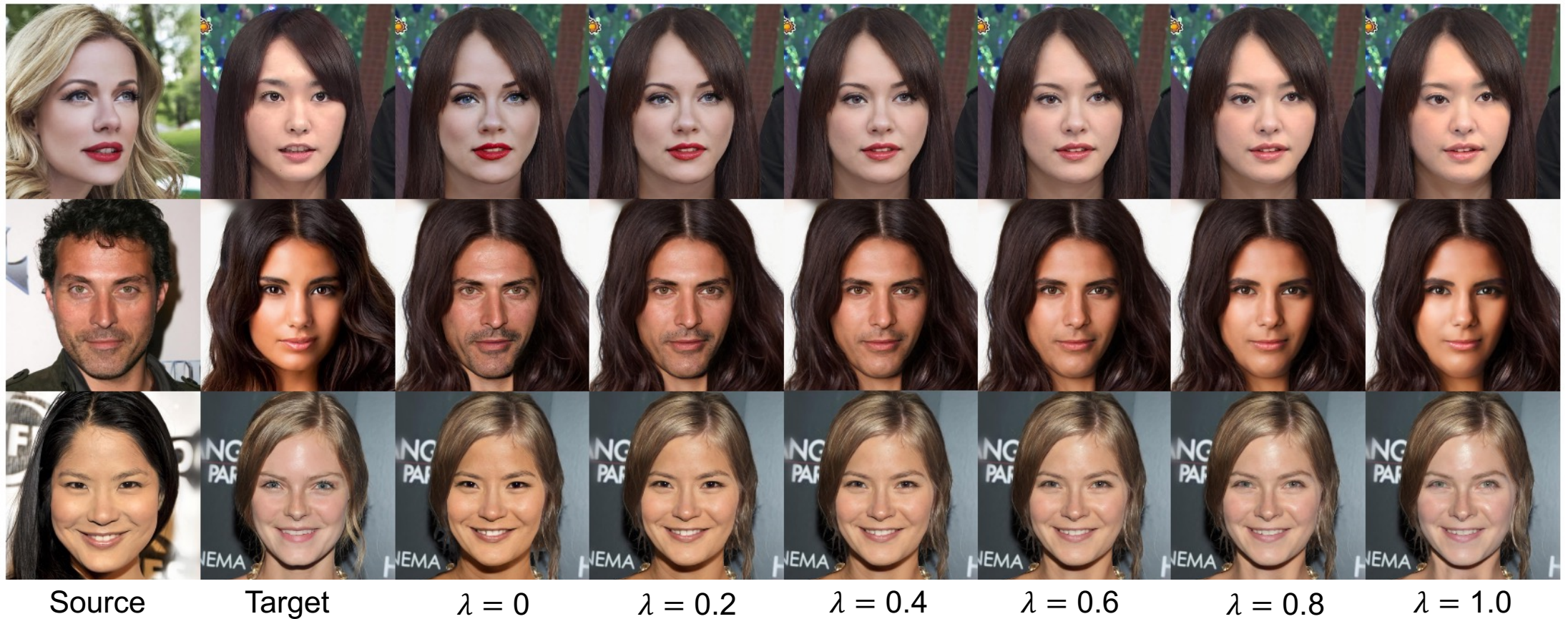
- In CelebAMask-HQ test set

method	SSIM \uparrow	PSNR \uparrow	RMSE \downarrow	FID \downarrow
SPADE [28]	0.64	15.67	0.17	20.45
SEAN [47]	0.71	18.57	0.12	17.74
MaskGAN [23]	0.75	19.42	0.11	19.03
Our RGI	0.82	19.85	0.10	15.03
SofGAN [8]	0.76	14.86	0.19	26.73
RGI-Optim.	0.86	23.02	0.07	14.73

- Better reconstruction in learning-based & optimization-based camps

Extensive tasks

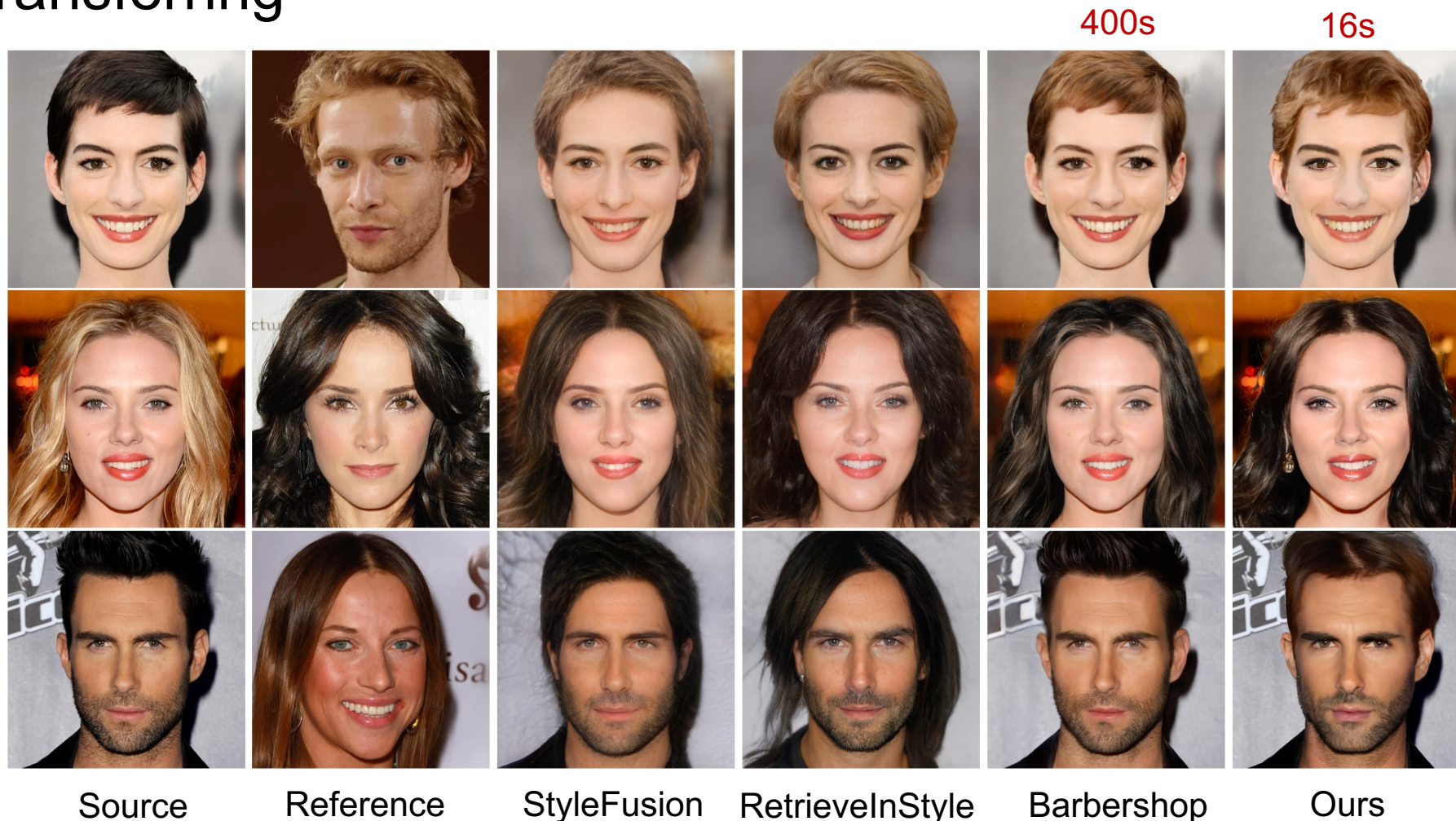
- Controllable face swapping



Towards source ← -----> Towards target

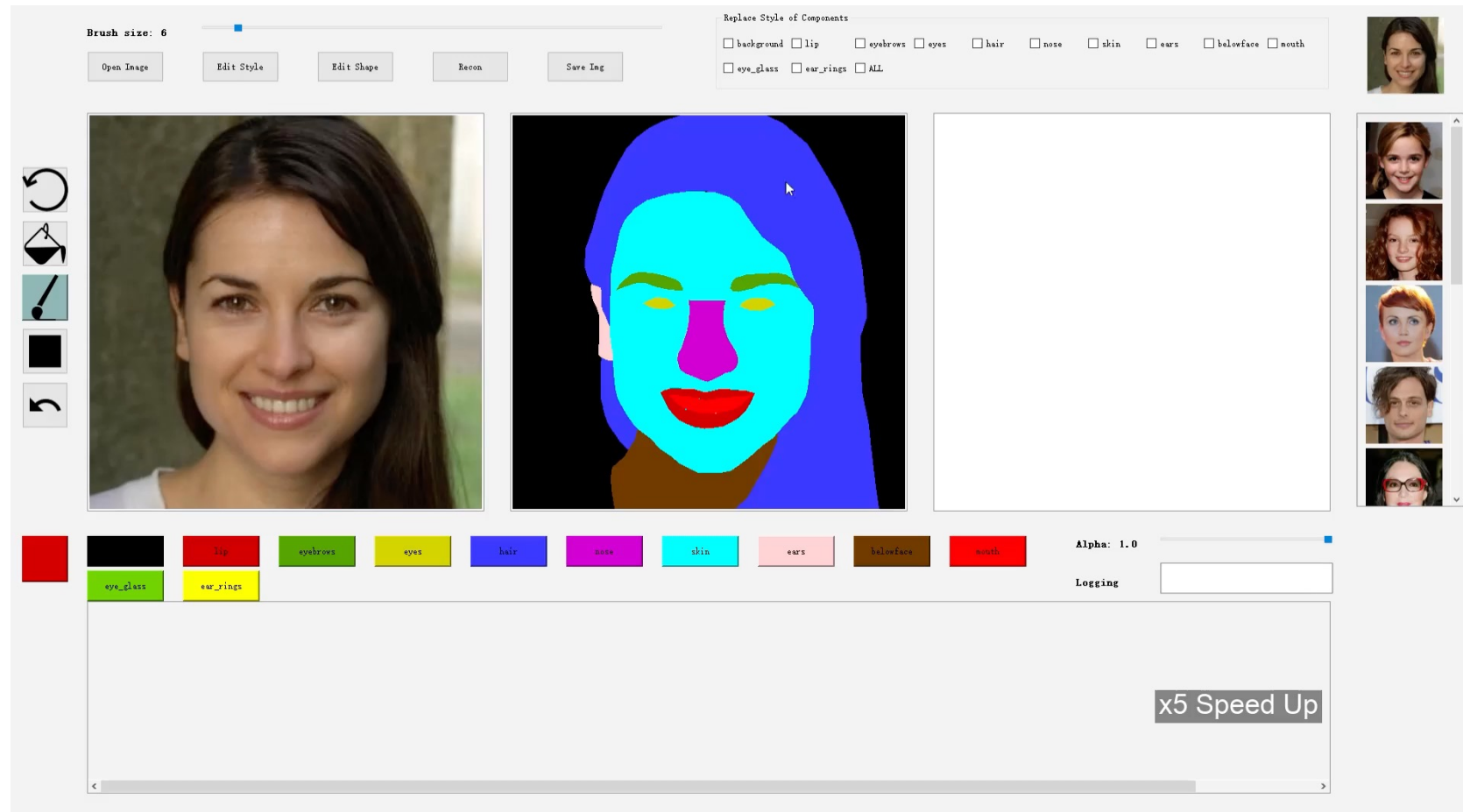
Extensive tasks

- Hair transferring



Extensive tasks

- Interactive face beautification system



Project QR Code



<https://e4s2022.github.io/>

Thank you!