Disentangled Lifespan Face Synthesis

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https://senhe.github.io/projects/iccv_2021_lifespan_face/

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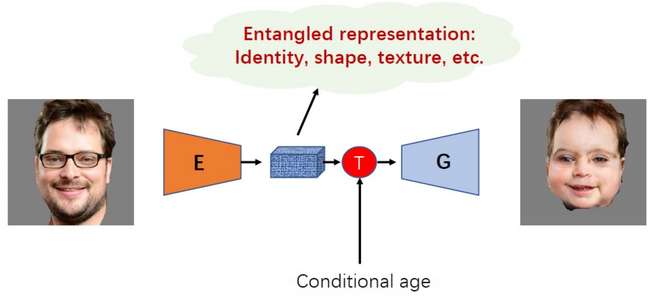
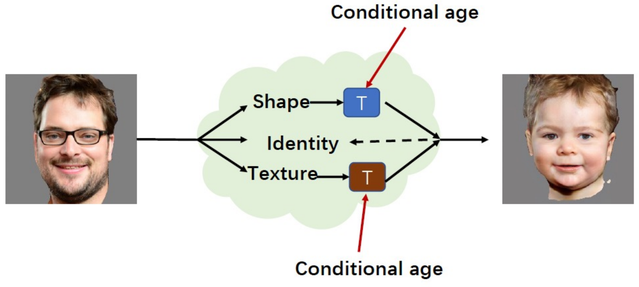
Lifespan Face Synthesis

1. Previous Methods – Domain Translation

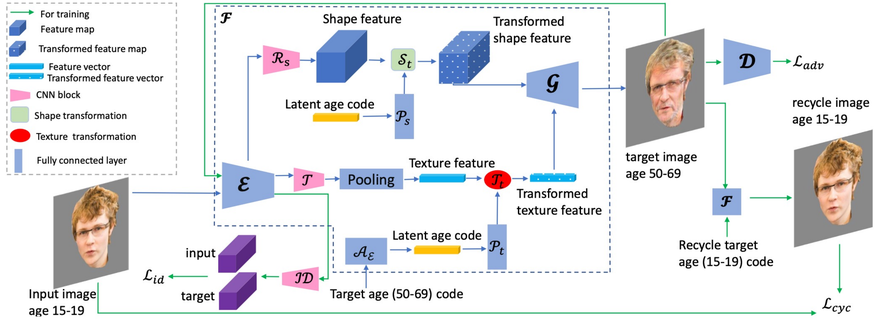


2. Our Motivation - Disentanglement



This work aims to disentangle shape, texture, identity, and explicitly model the transformation of shape and texture

Our Method



1. Shape Transformation

$$f_s(z_t) = \mathcal{S}_t(f_s, z_t) = \mathbf{conv}(f_s, \mathcal{M}(\mathbf{w}_s, \mathcal{P}_s(\mathcal{A}_\mathcal{E}(z_t))))$$

2. Texture Transformation

$$f_t(z_t) = \mathcal{T}_t(f_t, z_t) = f_t \circ \mathcal{P}_t(\mathcal{A}_\mathcal{E}(z_t))$$

3. Shape Regularization

$$\mathcal{L}_s = \|\mathcal{R}_s(\mathcal{E}_m(I_{r_e})) - \mathcal{R}_s(\mathcal{E}_m(I_{t_e}))\|^2$$

4. Identity Regularization

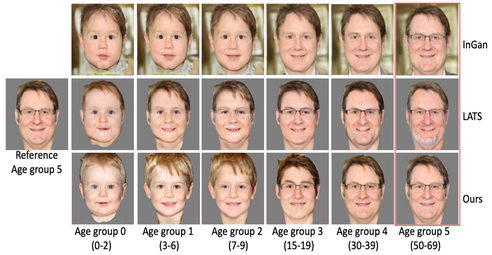
$$\mathcal{L}_{id} = \|\mathcal{ID}(\mathcal{E}_d(I_r)) - \mathcal{ID}(\mathcal{E}_d(I_t))\|^2$$

Results

Quantitative result

Methods	Identity preservation↑	Shape transformation↑	Texture transformation↑	Reconfiguration↑	Age error↓	Age accuracy↑
IPGAN [37]	**3.92±0.17**	2.38±0.42	2.50±0.12	3.93±0.01	11.33±0.89	27.0%
InGAN [43]	2.74±0.17	2.51±0.22	2.37±0.16	3.56±0.35	8.64±2.80	39.4%
LATS [24]	3.18±0.13	2.89±0.44	3.22±0.17	3.49±0.25	5.67±3.61	60.0%
Ours	3.07±0.19	**3.18±0.35**	**3.30±0.21**	**4.07±0.27**	**3.53±2.81**	**65.6%**

Qualitative result



Ablation study