Supplementary Material

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Abstract

Supplementary materials to the main paper.

1. Detailed Network Architecture

The architectures of the networks G and D are shown in Table 1 and Table 2.

2. Database Properties

We mainly use MORPH [3] and CACD [2] for training and validation. FG-NET [1] is also adopted for testing to make a fair comparison with prior work. The databases used in this paper are with different properties (see Table 3 and Fig. 1).

3. Additional Experimental Results

3.1. Additional Age Progression Results

Additional synthesized faces achieved on CACD and MORPH are provided in Figs. 2 and 3. The first image in each panel is the original face image and the subsequent 3 images are the age progressed visualizations for that subject in the [31- 40], [41-50] and 50+ age clusters. Although the examples cover a wide range of population in terms of race, gender, pose, makeup and expression, visually plausible and convincing aging effects are achieved. Our method is not only shown to be effective but also robust to the other variations.

3.2. Rejuvenating Simulation Results

The proposed method can also be applied for face rejuvenating simulation. In this experiment, all the test faces come from the people older than 30 years old, and they are transformed to the age bracket of below 30 years old. Example rejuvenating visualizations are shown in Figs. 4 and 5. As can be seen, this operation tightens the face skin, and the hair becomes thick and luxuriant as expected.

3.3. Additional comparison to the one-pathway discriminator

Figs. 6 and 7 provide more example faces compared with the one-pathway discriminator. Rejuvenating results are considered.

References

[1] *The FG-NET Aging Database*. http://www.fgnet.rsunit.com/ and http://www-prima.inrialpes.fr/FGnet/. 1, 2

[2] B.-C. Chen, C.-S. Chen, and W. H. Hsu. Face recognition and retrieval using cross-age reference coding with cross-age celebrity dataset. *IEEE TMM*, 17(6):804–815, 2015. 1, 2

[3] K. Ricanek and T. Tesafaye. Morph: A longitudinal image database of normal adult age-progression. In *FG*, pages 341–345, Apr. 2006. 1, 2

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Table 1. Generator architecture

Layer	conv.	conv.↓	conv.↓	res.	res.	res.	res.	deconv.↑	deconv.↑	deconv.
Kernel	9	3	3	3	3	3	3	3	3	9
Stride	1	2	2	1	1	1	1	2	2	1
Padding	4	1	1	2	2	2	2	1	1	4
Outputs	32	64	128	128	128	128	128	64	32	3

Table 2. Discriminator architecture

Pathway	Input	Layers (denote as: conv - <ouput>; kernel = 4, stride = 2, padding = 1)					
1	512				conv-512	conv-512	conv-1
2	256			conv-512	conv-512	conv-512	conv-1
3	128		conv-256	conv-512	conv-512	conv-512	conv-1
4	64	conv-128	conv-256	conv-512	conv-512	conv-512	conv-1

Table 3. Statistics of face aging databases used for evaluation

Database	**Number of images**	**Number of subjects**	**Number of images per subject**	**Time lapse per subject (years)**	**Age span (years old)**	**Average age (years old)**
MORPH [3]	52,099	12,938	1 - 53 (avg. 4.03)	0 - 33 (avg. 1.62)	16 - 77	33.07
CACD [2]	163,446	2,000	22 - 139 (avg. 81.72)	7 - 9 (avg. 8.99)	14 - 62	38.03
FG-NET [1]	1,002	82	6 - 18 (avg. 12.22)	11 - 54 (avg. 27.80)	0 - 69	15.84

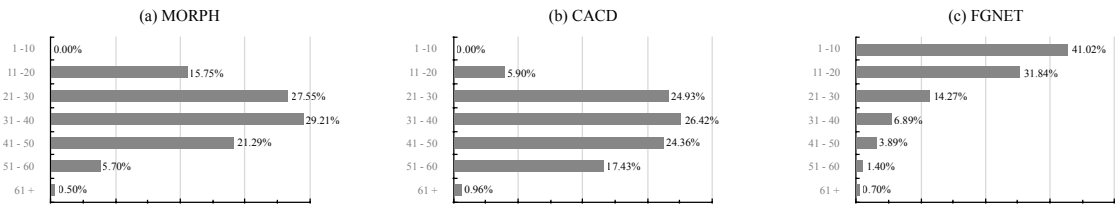

Figure 1. Age distributions of (a) MORPH, (b) CACD, and (c) FGNET.

Figure 2. Additional aging effects obtained on the CACD databases for 24 different subjects. The first image in each panel is the original face image and the subsequent 3 images are the age progressed visualizations for that subject in the [31- 40], [41-50] and 50+ age clusters.

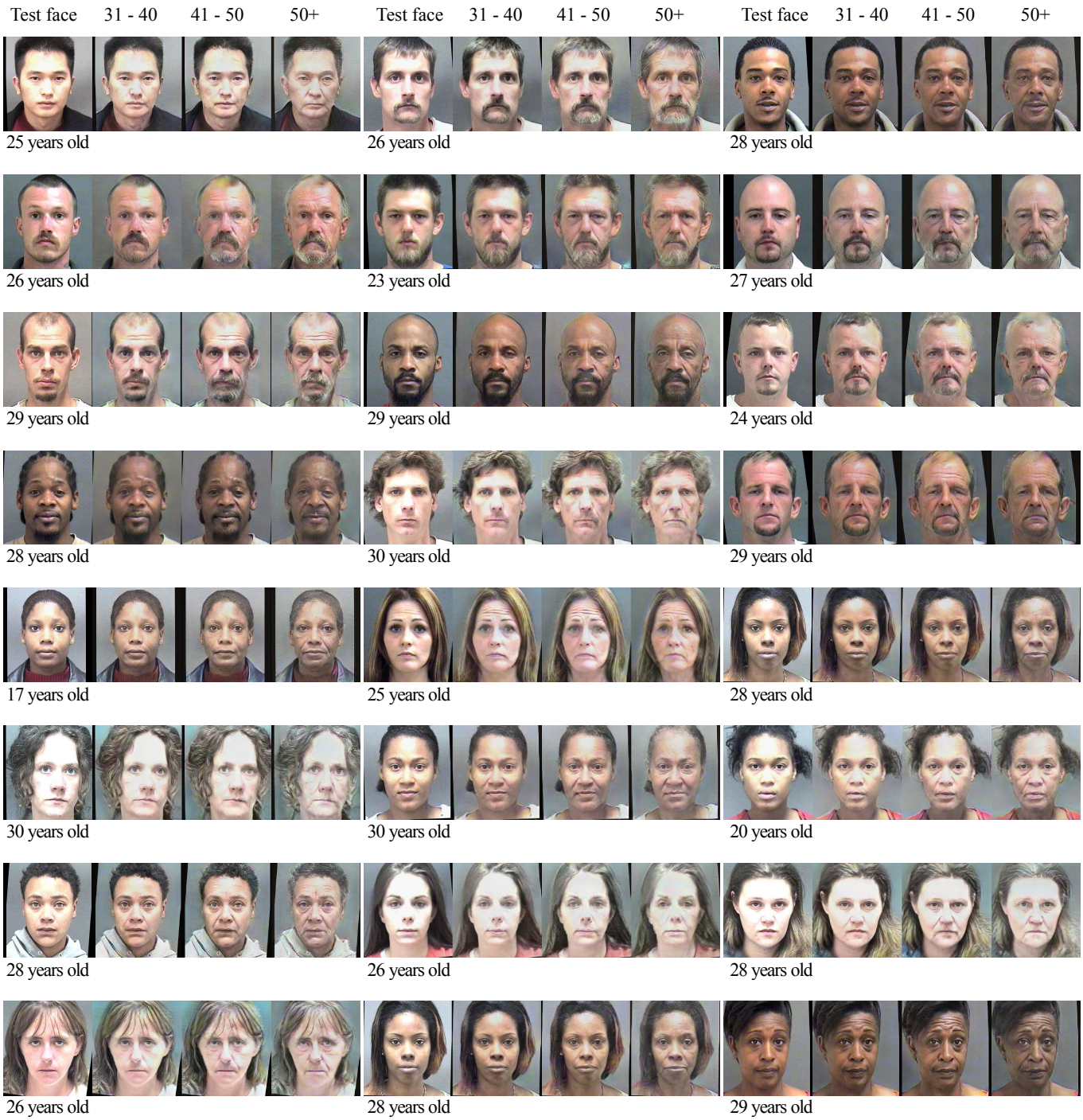

Figure 3. Additional aging effects obtained on the MORPH databases for 24 different subjects.

Figure 4. Rejuvenating results achieved on the CACD database for 24 different subjects. The first image in each panel is the original face image and the second is the corresponding rejuvenating result.

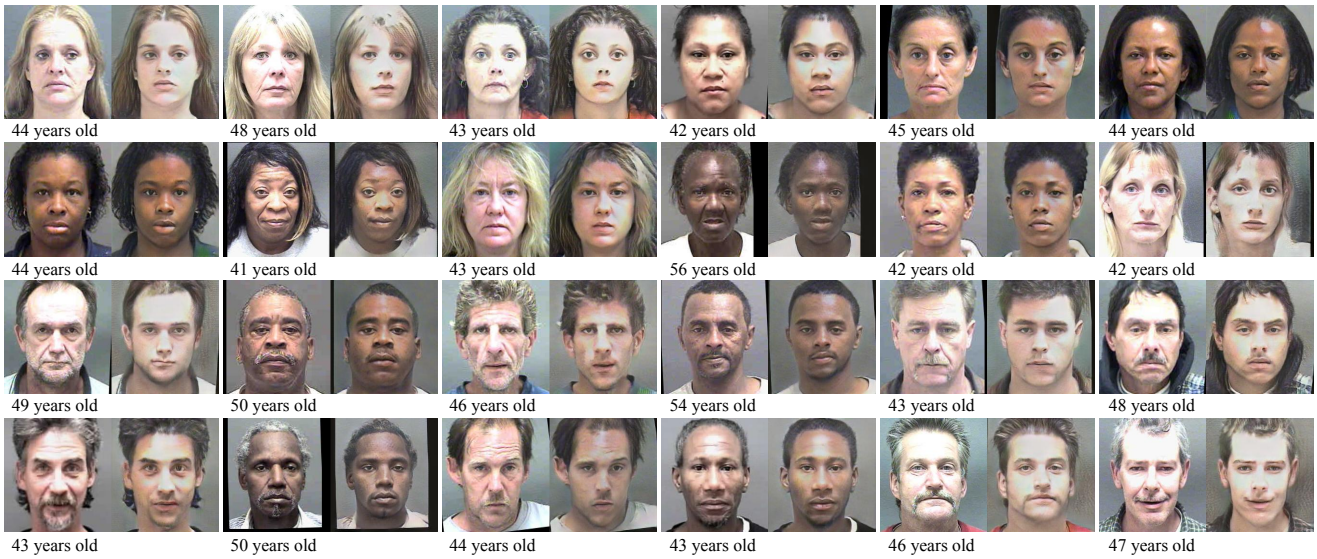

Figure 5. Rejuvenating results achieved on the MORPH database for 24 different subjects.

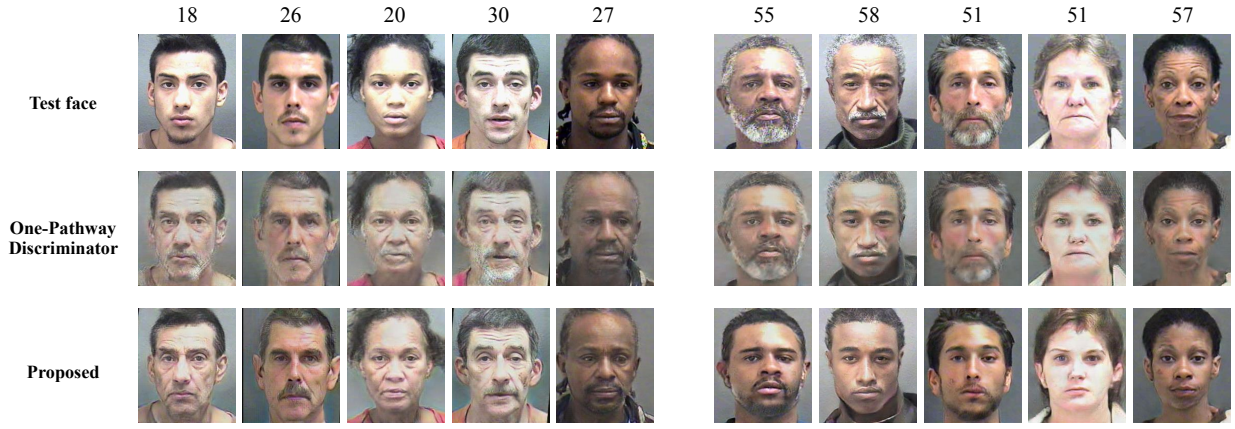

Figure 6. Additional visual comparison to the one-pathway discriminator on the MORPH database.

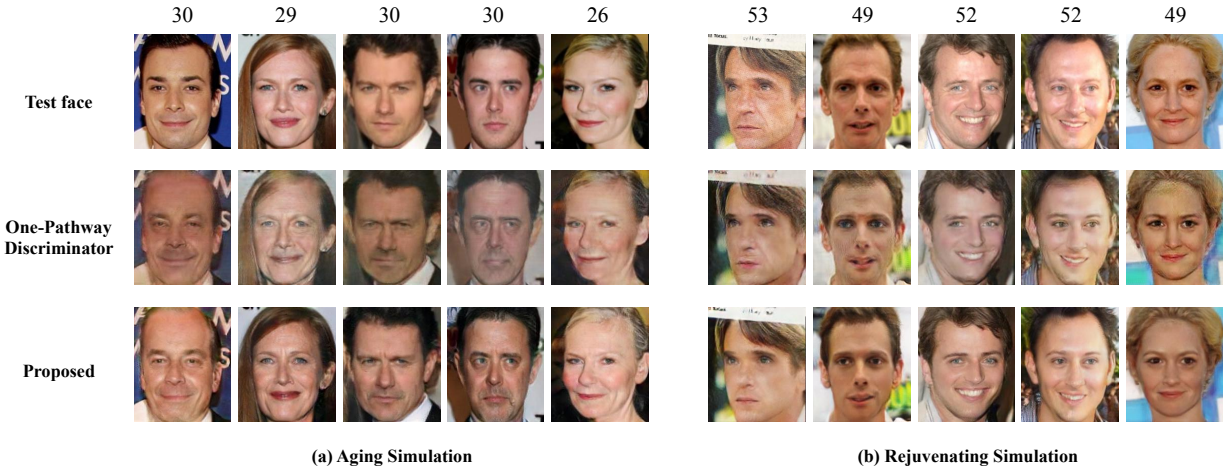

Figure 7. Additional visual comparison to the one-pathway discriminator on the CACD database.