

# Face De-occlusion using 3D Morphable Model and Generative Adversarial Network

## 1. Additional Results on Synthetic Images

Figure 1 shows the result when faces are occluded by glasses, masks, cups, and scarfs which usually appear at specific locations. Figure 2 shows the result when faces are occluded by hands, which is observed at arbitrary locations of the face.

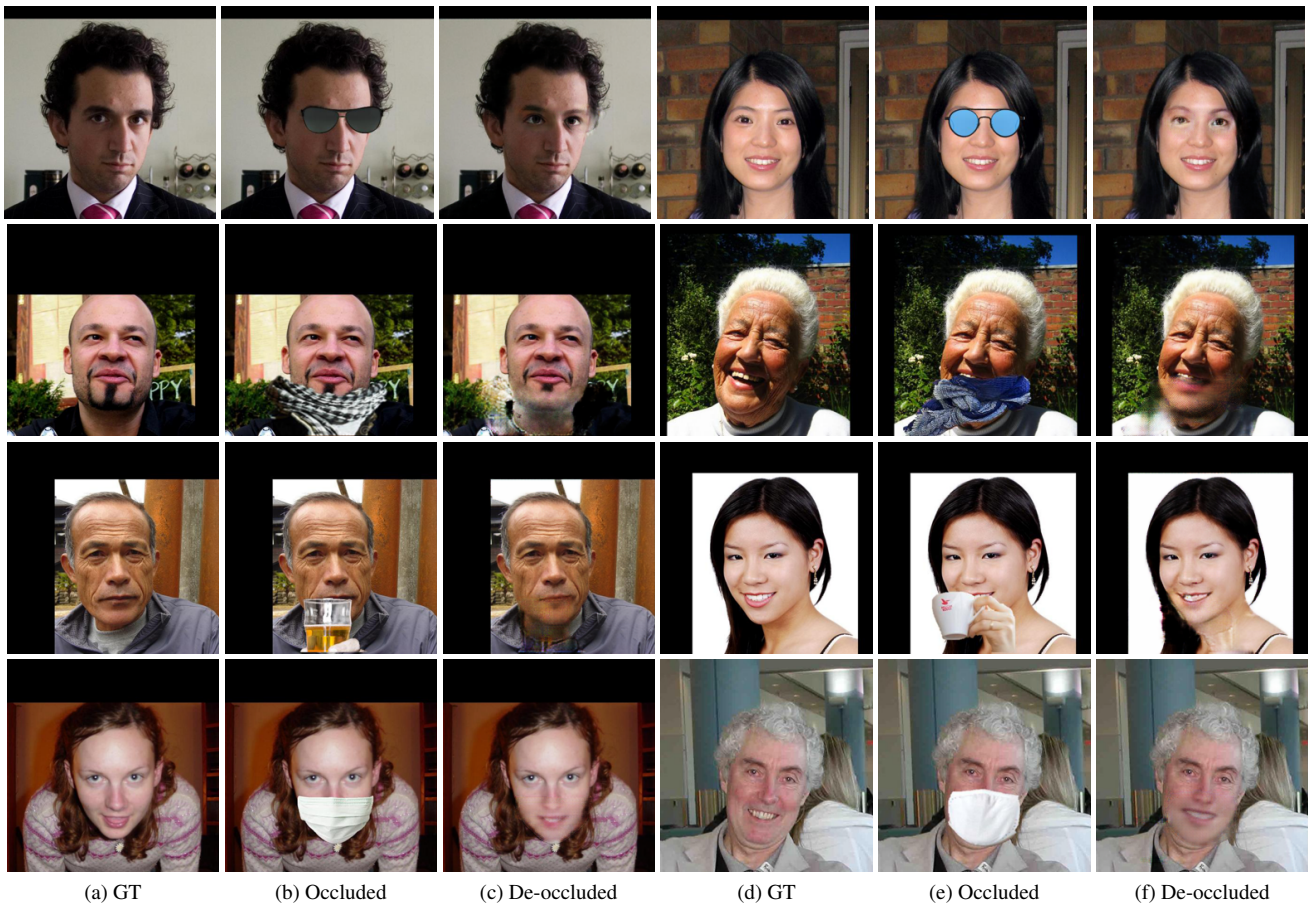


Figure 1: Additional face de-occlusion results on the synthetic images. (a)(d) Ground truths (GT). (b)(e) Occluded images. (c)(f) De-occlusion results.



Figure 2: Additional face de-occlusion result on the synthetic images. (a) Ground truths. (b)(d)(f) Occluded images. (c)(e)(g) De-occlusion results.



## 2. Additional Result on Real Images

Figure 3, Figure 4, and Figure 5 show the face de-occlusion results on the additional real images from 300W [3], AFLW2000-3D [1], and CelebA [2] datasets. Although the proposed model is only trained on synthetic images, it can still remove the occlusion on various real images with the different types of the occluders from the training dataset.

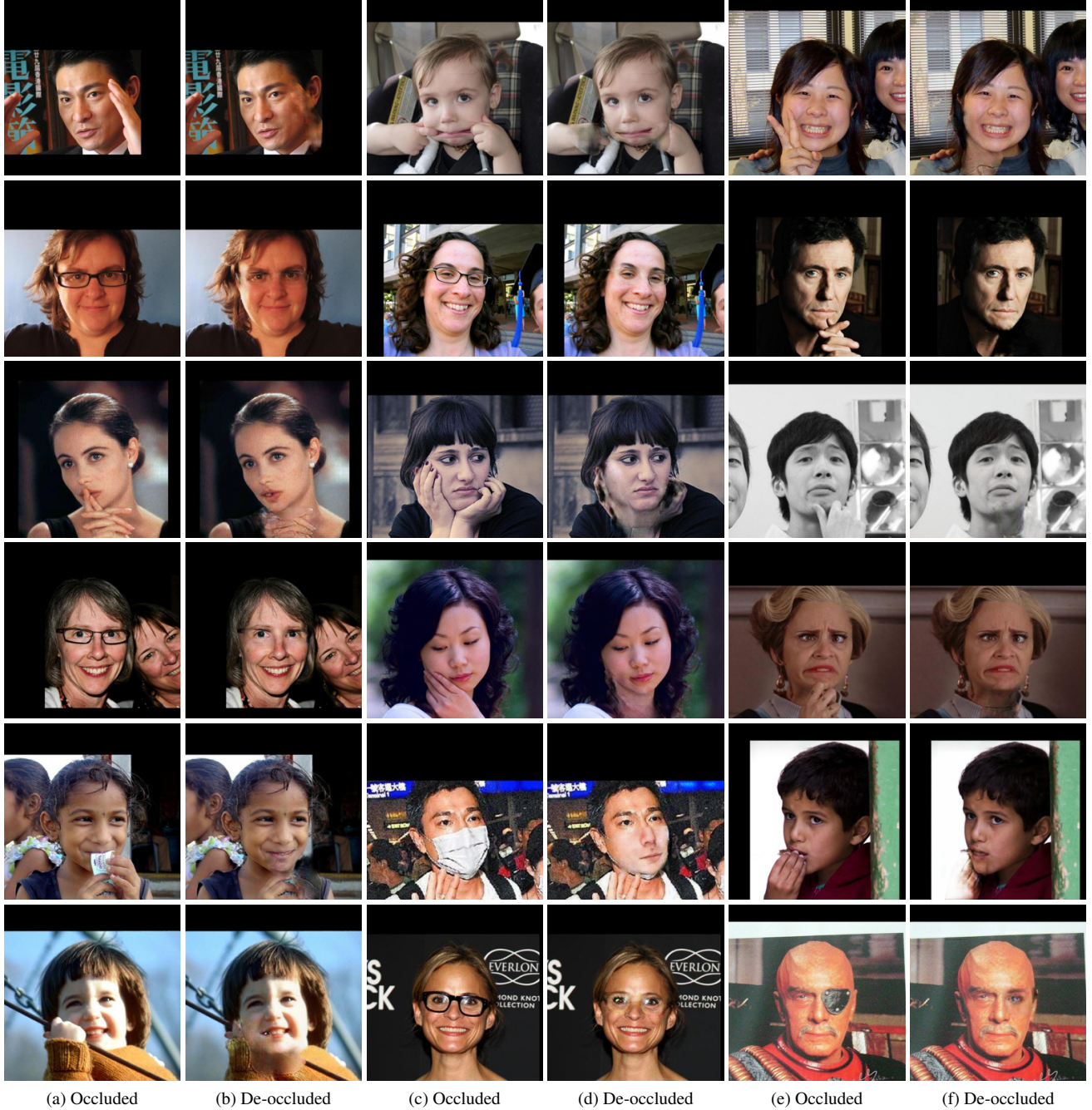


Figure 3: Additional face de-occlusion result on the real images from 300W and AFLW2000-3D. (a)(c)(e) Occluded images. (b)(d)(f) De-occlusion results.





Figure 4: Additional face de-occlusion result on the real images from CelebA. (a)(c)(e) Occluded images. (b)(d)(f) De-occlusion results.



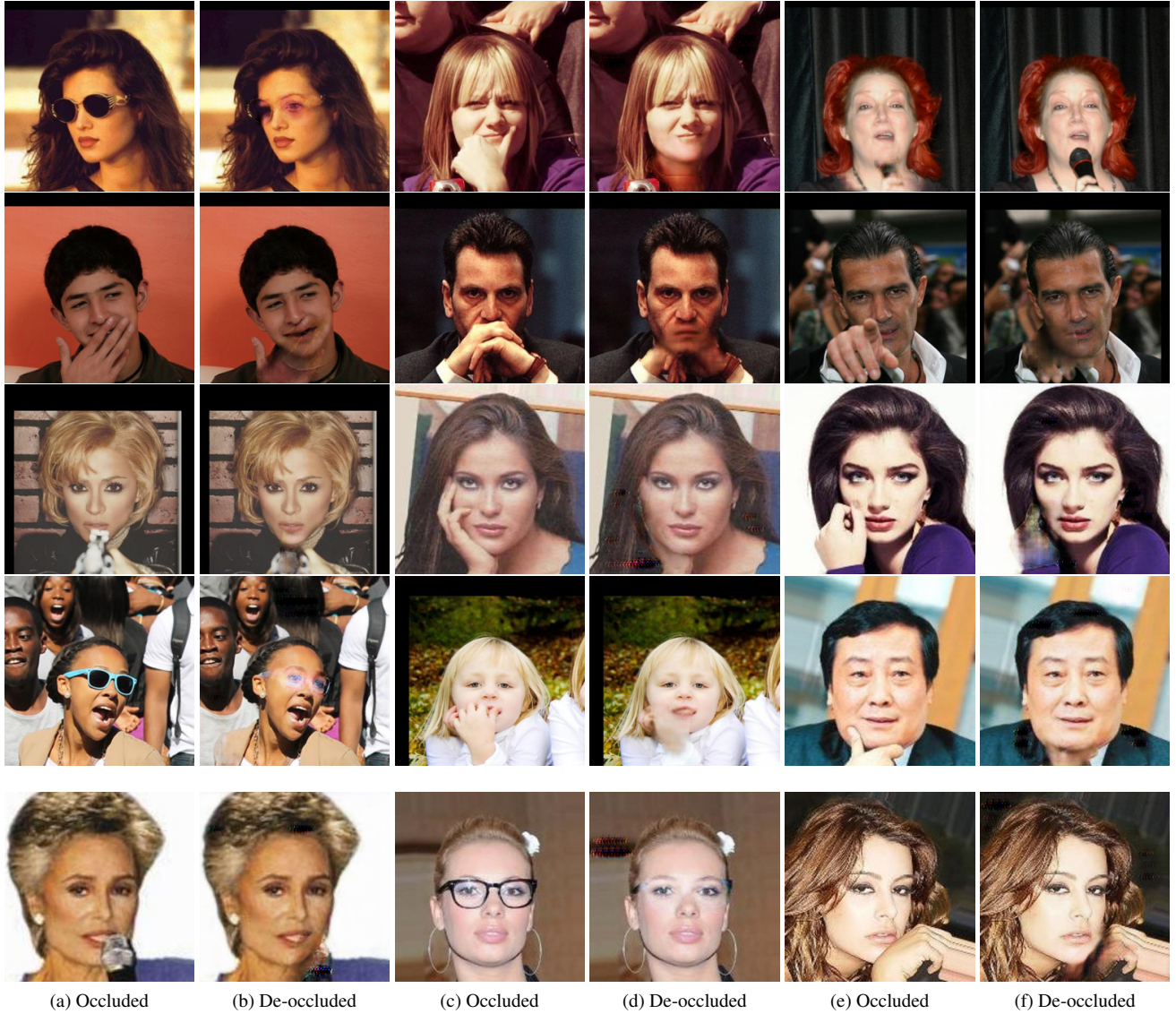


Figure 5: Additional face de-occlusion result on the real images. (a)(c)(e) Occluded images. (b)(d)(f) De-occlusion results.

## References

- [1] M. Köstinger, P. Wohlhart, P. M. Roth, and H. Bischof. Annotated facial landmarks in the wild: A large-scale, real-world database for facial landmark localization. In *Proc. IEEE International Conference on Computer Vision Workshops*, pages 2144–2151, 2011. 3
- [2] Z. Liu, P. Luo, X. Wang, and X. Tang. Deep learning face attributes in the wild. In *Proc. The IEEE International Conference on Computer Vision*, 2015. 3
- [3] C. Sagonas, G. Tzimiropoulos, S. Zafeiriou, and M. Pantic. A semi-automatic methodology for facial landmark annotation. In *Proc. IEEE Conference on Computer Vision and Pattern Recognition Workshops*, 2013. 3