Eyeglasses 3D shape reconstruction from a single face image

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Fig. 1. An illustration of the direction filtering in the correspondences search. (a): template mask. (b): frontalized glasses mask. (c): correspondences obtained without the direction filtering. We see there are some wrong correspondences connecting the inner contour with the outer contour. (d): correspondences obtained with the direction filtering. Notice that the correspondences are searched on the normalized images while here we use the frontalized images before the normalization, to better visualize the results. (e): deformation result using the correspondences in (c). We see the thickness of the glasses frame is not consistent with the input. (f): deformation result using the correspondences in (d).



Fig. 2. An illustration of the symmetry constraint in glasses deformation. From left to right: the input images, deformed mesh without the symmetry constraint, deformed mesh with the symmetry constraint. As 3D estimation from 2D has an inherent ambiguity, extreme glasses pose may lead to asymmetric glasses shape as the frontalization can not be perfect. But with the additional symmetry constraint, the asymmetric artifacts can be eliminated.



Fig. 3. Qualitative comparison with the method proposed in [1] on their test images with frontal faces. From top to bottom: input images, images overlapped with our reconstruction, images overlapped with [1]'s reconstruction. We denote the inaccurate parts of the results with green dashed boxes. Our method outputs comparable reconstruction results with the method in [1] on frontal images. The artifacts of the both methods are majorly contributed by the large shape difference between the used templates and the input, which the deformation can not handle. Notice that our technique is not limited to frontal faces as [1]. We are able to handle various head poses as shown in Fig. 4.



Fig. 4. Additional results for our system which reconstructs eyeglasses from a single input image with an arbitrary head pose. And the system is also robust to partial occlusion, extreme lighting and various glasses shapes.

References

 Yuan, X., Tang, D., Liu, Y., Ling, Q., Fang, L.: Magic glasses: from 2d to 3d. IEEE Transactions on Circuits and Systems for Video Technology (TCSVT) 27(4), 843–854 (2016)