Effective Face Frontalization in Unconstrained Images

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“Frontalization” is the process of synthesizing frontal facing views of faces appearing in single unconstrained photos. Recent reports have suggested that this process may substantially boost the performance of face recognition systems. This, by transforming the challenging problem of recognizing faces viewed from unconstrained viewpoints to the easier problem of recognizing faces in constrained, forward facing poses. Previous frontalization methods did this by attempting to approximate 3D facial shapes for each query image. We observe that 3D face shape estimation from unconstrained photos may be a harder problem than frontalization and can potentially introduce facial misalignments. Instead, we explore the simpler approach of using a single, unmodified, 3D surface as an approximation to the shape of all input faces. We show that this leads to a straightforward, efficient and easy to implement method for frontalization. More importantly, it produces aesthetic new frontal views and is surprisingly effective when used for face recognition and gender estimation.

Observation 1: For frontalization, one rough estimate of the 3D facial shape seems as good as another, demonstrated by the following example:

The top row shows surfaces estimated for the same query (left) by Hassner [2] (mid) and DeepFaces [6] (right). Frontalizations are shown at the bottom using our single-3D approach (left), Hassner (mid) and DeepFaces (right). Clearly, both surfaces are rough approximations to the facial shape. Moreover, despite the different surfaces, all results seem qualitatively similar, calling to question the need for shape estimation for frontalization.

Result 1: A novel frontalization method using a single, unmodified 3D reference shape is described in the paper (illustrated in Fig. 2).

Observation 2: A single, unmodified 3D reference shape produces aggressively aligned faces, as can be observed in Fig. 3.


Conclusion: On the role of 2D appearance vs. 3D shape in face recognition, our results suggest that 3D shape estimation may be unnecessary.

For full text, updated results, code and data please see our project web-page: goo.gl/RAZU67