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3D Morphable Models for pose and illumination invariant face recognition

Morphable face models constitute a unifying framework for the analysis and synthesis of images. In the field of Computer Graphics, they are applied to synthesize photo-realistic animation of face images; in the domain of Computer Vision, they are used in face recognition applications compensating variations across pose, illumination and facial expressions. Morphable face models draw on prior knowledge of human faces in the form of a general face model, learned from examples of other faces. Whether these examples are two-dimensional images or three-dimensional face representations, the Morphable Model derived thereon share a common structure. By exploiting the correspondences between all face examples, these models introduce a vector space structure on the examples that allows to synthesize novel photo-realistic images of faces. Face analysis can be performed by fitting such a flexible model to novel images. Then, the model parameters yielding the optimal reconstruction are used to code or analyze the face depicted. In this talk, I start with a motivation of the analysis by synthesis approach and a discussion on the advantages of three-dimensional versus image based image models for image analysis. Then, the structure of the three-dimensional Morphable Face Model as used in our experiments will be explained in detail. The talk will conclude with recent result and and discussion on limitations of our current implementation.