Next Generation 3D Face Models

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Abstract

Having a compact, expressive and artist friendly way to represent and manipulate human faces has been of prime interest to the visual effects community for the past several decades as face models play a very important role in many face capture workflows. In this short course, we go over the evolution of 3D face models used to model and animate facial identity and expression in the computer graphics community, and discuss how the recent emergence of deep face models is transforming this landscape by enabling new artistic choices. In this first installment, the course will take the audience through the evolution of face models, starting with simple blendshape models introduced in the 1980s; that continue to be extremely popular today, to recent deep shape models that utilize neural networks to represent and manipulate face shapes in an artist friendly fashion. As the course is meant to be beginner friendly, the course will commence with a quick introduction to non-neural parametric shape models starting with linear blendshape and morphable models. We will then switch focus to deep shape models, particularly those that offer intuitive control to artists. We will discuss multiple variants of such deep face models that i) allow semantic control, ii) are agnostic to the underlying topology of the manipulated shape, iii) provide the ability to explicitly model a sequence of 3D shapes or animations, and iv) allow for the simulation of physical effects. Applications that will be discussed include face shape synthesis, identity and expression interpolation, rig generation, performance retargeting, animation synthesis and more.