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Affordable Content Creation for Free-Viewpoint Video and VR/AR Applications

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Abstract

We present a scalable pipeline for Free-Viewpoint Video (FVV) content creation, considering also visualisation in Augmented Reality (AR) and Virtual Reality (VR). We support a range of scenarios where there may be a limited number of handheld consumer cameras, but also demonstrate how our method can be applied in professional multi-camera setups. Our novel pipeline extends many state-of-the-art techniques (such as structure-from-motion, shape-from-silhouette and multi-view stereo) and incorporates bio-mechanical constraints through 3D skeletal information as well as efficient camera pose estimation algorithms. We introduce multi-source shape-from-silhouette (MS-SfS) combined with fusion of different geometry data as crucial components for accurate reconstruction in sparse camera settings. Our approach is highly flexible and our results indicate suitability either for affordable content creation for VR/AR or for interactive FVV visualisation where a user can choose an arbitrary viewpoint or sweep between known views using view synthesis.

Keywords: Free-viewpoint video, 3D reconstruction, Texturing, View synthesis, Augmented reality, Virtual reality

1. Introduction

In the classical experience of movies or TV, a director carefully chooses a particular viewing angle and sequence of scenes in order to convey a story. Emerging

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