3D Reconstruction with Priors

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Abstract

Image-based 3D reconstruction techniques have seen a revolution in the last decade. Structure-from-Motion and Multi-View Stereo are particularly successful examples, which have been extensively used for many real products in various industries such as digital mapping and visual effects. A recent addition of consumer grade depth cameras (e.g., Microsoft Kinect Camera) brought another revolution to the field for indoor scenes.

This tutorial starts from the fundamentals of 3D reconstruction from images, then looks at state-of-the-art research projects by following a recent research trend in 3D Computer Vision, which is to exploit structural priors to enhance 3D reconstruction. The form of priors should depend on your scene types as well as your applications. This tutorial, in particular, takes a close look at a family of piecewise planar/parametric 3D reconstruction algorithms.

Keywords
3D modeling, multi-view stereo, image-based rendering, structure prior