

The Epipolar Occlusion Camera

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A depth image constructed with a pinhole camera suffers from disocclusion errors: even a minimal viewpoint translation exposes samples not visible from the original viewpoint and thus missing from the depth image. The conventional solution is to employ additional depth images to provide the missing samples, which is inefficient. A promising recent approach is to render the depth image with a non-pinhole called an occlusion camera, which also gathers samples not seen from the reference viewpoint but needed for nearby viewpoints. The single-pole and depth-discontinuity occlusion cameras developed so far place restrictions on the scene complexity and do not allow the application to define the set of viewpoints of interest.

We introduce the epipolar occlusion camera (EOC), which overcomes these disadvantages. An EOC is a non-pinhole which gathers samples of a 3D scene visible from a segment of viewpoints. The EOC is constructed by expressing the disocclusion events in the (2D) image as the sum of independent disocclusion events along (1D) epipolar lines. The EOC image has a single layer, is non-redundant, and is constructed efficiently by directly rendering the 3D scene with the EOC in feed-forward fashion, through projection followed by rasterization. We describe several applications of EOCs.