Structure from Visibility: Finding low-textured and reflective occluders in outdoor scenes using visibility and occlusion

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Geometry reconstruction has been an important but challenging field of research within computer vision. Many approaches rely on extracting certain features (silhouettes, interest points, similar coloured pixels) from images, and are inherently dependent on the ability to find reliable features on all objects. Objects not rich in features or objects with non-Lambertian properties result in poor reconstructions. However, detection failures can provide useful clues as well. In this thesis, we propose an approach based on both visibility of detected features *and* occlusion of features detected in other images. The approach aims at finding and reconstructing objects *indirectly* by noticing the absence of expected features, without relying on detection of any cues on the objects theirselves.

The suggested approach is tested on new datasets containing footage of low-textured and reflective objects. Given enough view points and texture on background objects, the developed and implemented method is able to reconstruct both low-textured and reflective objects. Results are compared to a state-of-the-art dense stereo reconstruction and found to perform better on reflective and big low-textured objects.