

# Symmetry-Based Model Completion for Efficient 3D Acquisition

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Creating complete models of real-world objects from captured images is an important part of computer graphics and geometric modeling. However, a challenge for image-based techniques is obtaining a complete model of the 3D object from only a few images. Our key observation is that by taking advantage of the symmetric properties of many natural and manmade objects we can quickly and efficiently classify the symmetry into one of a small set of cases, and then perform a plausible reconstruction of more than what is visible from the set of input images. We classify the symmetry of the object and then perform model completion. Using an optimization-based technique we discover and transfer the symmetric structure of the object and using blending and texture-mapping we transfer the color and texture information. Unlike previous approaches, our model completion does not require an object database, produces colored models, and supports three related families of symmetric objects. We demonstrate our approach by capturing, reconstructing, and completing several real-world objects, ranging up to several hundred thousand texture-mapped triangles.