

Capability of Photoscan, a commercial implementation of the Structure from Motion technique, for Asteroid Shape Reconstruction

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Shape model reconstruction of asteroids from images taken is important to control the spacecraft safely and scientific analysis of the asteroid exploration missions including Hayabusa2. Mori (2014) evaluated the capability of Bundler (Snavely, 2006), an implementation of structure from motion, in the asteroid shape reconstruction from images of explorer missions. However, Bundler has problems on robustness and stable processing. Agisoft Photoscan, a commercial implementation of structure from motion, is a possible alternate of Bundler. Photoscan is widely used in the geoscience research field. We evaluate the capability of Photoscan for asteroid shape reconstruction in Hayabusa2. We used image sets chosen from the asteroid Itokawa data set taken by Hayabusa as input images and the Itokawa's shape model reconstructed by Gaskell (2006) as the reference model. They are the same as those used by Mori (2014). We also follow his work on the evaluation scheme. Through our test, Photoscan succeeded to reconstruct the Itokawa's shape even from a dataset with a limited number of images, with which Bundler failed. Photoscan results also show stable accuracies in such cases. Robustness and stability of Photoscan are superior to those of Bundler. We conclude that Photoscan has enough capability for asteroid shape reconstruction.

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