

# Implementation of an ISIS Compatible Image Matching Tool for 3D Stereo Reconstruction

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The department for Planetary Geodesy at TU Berlin is developing routines for photogrammetric processing of planetary image data to derive 3D representations of planetary surfaces. The ISIS software, developed by USGS, Flagstaff, was chosen as the primary processing platform since it is open source, very well documented and widely used within the planetary science community. However, ISIS does not provide a full photogrammetric stereo processing chain. Several components like image matching, bundle block adjustment (until recently) or digital terrain model (DTM) interpolation from 3D object points are missing. Hence, our group aims to complete this photogrammetric stereo processing chain by implementing the missing components, taking advantage of already existing ISIS classes and functionality. With this abstract we would like to report on the development of a new matching software that is optimized for both orbital and close-ranged planetary images and compatible with ISIS formats and routines.

The matching software is a C++ application with multi-threading support. The input images do not need be rectified beforehand. Internally, the matcher detects the geometrical differences and minimize them with a grid-based feature matching approach. The transformation parameters are calculated for the whole image or smaller sized grids with the help of SURF features. The matching is applied to the transformed grids based on the area-based matching algorithms like normalized cross-correlation (NCC) and least-squares matching (LSM). NCC delivers an approximate value of disparity. LSM refines the result to sub-pixel accuracy.

