

# Automatic crater detection by mining existing crater map

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## Abstract:

Existing geomorphologic type maps manually delineated by experts contain implicit expert knowledge on the spatial structure of real geomorphologic objects. Taking crater map as example, this study presents an attempt of mining the implicit expert knowledge contained in existing crater maps to automatically detect craters from digital elevation models (DEMs) of an area with similar environment as the area of the crater map.

The proposed automatic crater detection approach trains random forests classifiers based on existing crater map of an area and the spatial structural information derived by digital terrain analysis on DEM in the corresponding area, and then applies the trained classifiers to the application area with DEM.

A case study with the Lunar Orbiter Laser Altimeter (LOLA) crater map (Head et al., 2010) and Chang'E-1 lunar DEM (Li et al., 2010) with a resolution of 500 m shows that the proposed approach performed better than AutoCrat (Stepinski et al., 2009; 2012), a representative of existing crater detection approaches based on digital terrain analysis which have not effectively considered the spatial structural information of real craters.