Geophysical Research Abstracts
Vol. 14, EGU2012-11952, 2012
EGU General Assembly 2012

The Survey of Impact Crater Detection Algorithm

Y. Liu, J. Liu, L. Mu, and C. Li
National Astronomical Observatories, CAS, Beijing,China (liuyx@bao.ac.cn)

Abstract:
The crater detection algorithm (CDA) is an algorithm wherein the input is image (optical, topography or any other type) and the output is list of craters including coordinates (longitude, latitude) and diameter. In addition to basic attributes, CDA can provide for each detected crater additional attributes such as probability (that detected feature is a crater), ellipse eccentricity and tilt, depth and depth/diameter ration, etc.
Presently, many algorithms have been applied in the impact crater detection, and the accuracy and adaptability are not quite similar among different algorithms and data. Firstly, this paper summarizes the current advance and generalizes CDAs. CDAs could be divided into four general categories: 1) Artificial cognition, 2) Shape fitting algorithm, including Hough Transform, conic fitting, template matching etc., 3) Machine learning, including SVM, genetic algorithm, neural network etc., 4)Geoscience information analysis, including using terrain data and spectrum data. Secondly, this paper indicating the advantages and disadvantages of different approaches and their applicable condition. According to compare with different approaches, the conclusions are as following. 1) Artificial cognition is suitable for image data. The accuracy depends on the researcher's experience, and the efficiency is low. 2) Shape fitting algorithm is suitable for the craters whose structures are simple and edges are obvious. 3) Machine learning algorithm need great quantity samples to improve its detection accuracy. 4) The approaches based on terrain data is not depends on the quality of an image, which, in turn, depends on illumination, surface properties. But the disadvantage is that the topography data's resolution is not good as the optical data. Finally, the study focus and solutions were presented. With more and more highly accurate data are obtained, the research of crater detection will concentrates on using several kinds of data simultaneously and combine their results.