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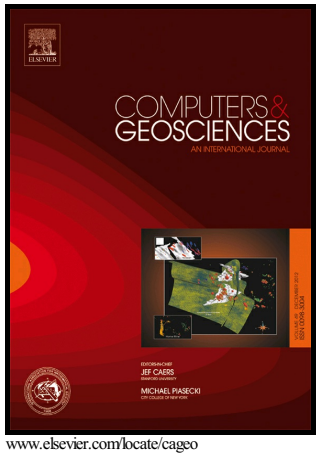

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A region-growing approach for automatic outcrop fracture extraction from a three-dimensional point cloud

Xin Wang[a], Lejun Zou[a], Xiaohua Shen[a,*], Yupeng Ren[a], Yi Qin[a]

[a]*Department of Earth Sciences, Zhejiang University Yuquan Campus, 38 Zheda Road, Hangzhou 310027, China*

Abstract

Conventional manual surveys of rock mass fractures usually require large amounts of time and labor; yet, they provide a relatively small set of data that cannot be considered representative of the study region. Terrestrial laser scanners are increasingly used for fracture surveys because they can efficiently acquire large area, high-resolution, three-dimensional (3D) point clouds from outcrops. However, extracting fractures and other planar surfaces from 3D outcrop point clouds is still a challenging task. No method has been reported that can be used to automatically extract the full extent of every individual fracture from a 3D outcrop point cloud. In this study, we propose a method using a region-growing approach to address this problem; the method also estimates the orientation of each fracture. In this method, criteria based on the local surface normal and curvature of the point cloud are used to initiate and control the growth of the fracture region. In tests using outcrop point cloud data, the proposed method identified and extracted the full extent of individual fractures with high accuracy. Compared with manually acquired

*Corresponding author
Email address: shenxh@zju.edu.cn (Xiaohua Shen)