

3D Point Cloud Based Spatio-Temporal Monitoring of Natural Objects

Jens-André Paffenholz, Bastian Steinhoff-Knopp (Germany) and Corinna Harmening (Austria)

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SUMMARY

This paper aims to provide an overview of the field of 3D point cloud based spatio-temporal monitoring. The focus is on spatio-temporal monitoring of natural objects, like plants and scenes of soil erosion features, with the aid of 3D point clouds acquired by means of a laser scanner as a main object capturing sensor within a multi-sensor-systems (MSS).

First, we discuss the technical aspects of 3D point cloud acquisition with respect to monitoring applications. In particular, the challenges and chances of the surface-based technique over classical point-wise techniques will be outlined. Second, we highlight some results of self-conducted experiments: We focus on the evaluation of an object's abstraction for epochal comparison by means of area-based and shape-based approaches as well as on soil erosion scenes. Both examples deal with the abstraction of natural objects by means of B-spline surfaces. On the one hand, 3D point clouds of plant leaves are investigated with the aim to obtain measures of interest like overall sizes and area. On the other hand, 3D point clouds of soil erosion features are investigated with the focus on the quantification of volumes. We conclude our paper with some perspectives on the upcoming work plan of the IAG working group 4.1.3 in close cooperation with the FIG commission 6 to make significant contributions to the 3D point cloud based spatio-temporal monitoring of natural and also artificial objects.