

State-of-the Art of Collecting 3D Rural Landscape Models

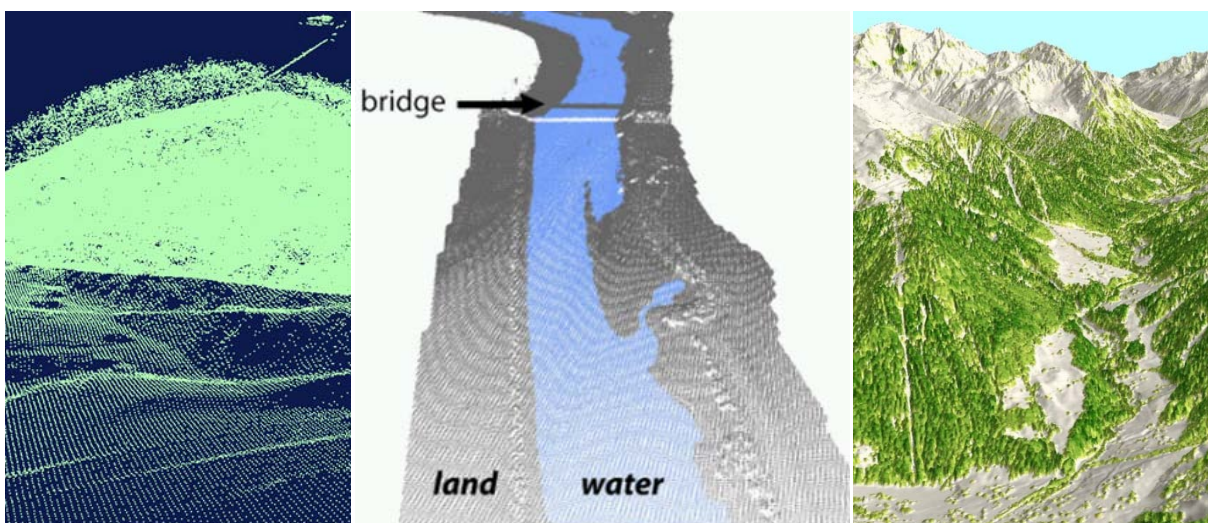
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Driven by economic developments and by legislation, e.g., EU directives Fauna-Flora-Habitat, Water-Framework, Environmental Noise, etc., the demand for information on our natural and artificial environment is rising. Demands are growing in update cycles, in production efficiency, on accuracy, and in faithful and detailed modeling. This holds especially for spatial information, much of which is provided by photogrammetry because of its advantages of capturing large areas in short time and because of its high degree of automation. This holds for photogrammetry, no matter if aerial or satellite images are used for geometric reconstruction, or if forward intersection is used for point determination or a polar method, i.e., laser scanning.

Photogrammetry is inherently a 3D technology and terrain models, derived from forward intersection of a stereo pair, were also among the first 3D products to enter GIS. However, the aerial view restricts the manifold in 3D modeling and height is represented as a scalar-valued function over a planar domain. New approaches in sensors and platforms, e.g., oblique imagery, laser scanning, dynamic terrestrial acquisition, unmanned aerial vehicles, etc., enable "more" 3D modeling. A second transition is upgrading from primarily geometric modeling to automated inference of thematic information. This automatic interpretation of scenes is obvious in 3D city modeling, but more and more thematic information is to be derived in rural areas, too. This includes, e.g., vegetation parameterization or modeling in mountain areas.

The state-of-the-art in aerial imaging and laser scanning will be presented. Examples of modeling the terrain, the vegetation, and water surfaces will be presented. These technological advances are currently not finding their way into practical applications because of a lack of suitable software. Suitable data and management structures for handling huge point clouds with a list of attributes will have to be made available.



Point cloud with terrain, vegetation, and ski-jump; classified point cloud; vegetation height model (Data courtesy: Federal surveying offices of Tyrol and Vorarlberg. Examples provided by Institute of Photogrammetry and Remote Sensing, Bernhard Höfle and Markus Hollaus, Vienna University of Technology)