Automated Change Detection for Validation and Update of Geodata

Traditionally, different manual, labour intensive and hence costly methods have been used for change detection. Conducting field inspections, comparing the map contents with the real world "on location" is one method. In another method two neighbouring images from a flight campaign are used and a stereo model generated. The digital map database is superimposed (in 3D) on the stereo model, and a stereo-operator locates the differences. Automating the update process for a topographic map database is, however, non-trivial, as it involves the comparison of the existing (vector based) map database to newer (raster based) remote sensing images in order to detect changes in objects. In this paper an automatic change detection method considering changes in the building theme and based on colour-infrared (CIR) aerial photographs in combination with height information (LIDAR, digital photogrammetry) is presented. Height information is used to determine the location of object which stands above terrain, and the CIR-Imagery is used to exclude vegetation, leading to a potential buildings mask. Comparing the existing objects in the map database with these extracted objects leads to a validation of the map database and hence change detection. The success of the method is strongly dependent on the representation of buildings in the DSM and hence the possibility to detect their locations. Therefore the method used for estimation of the digital terrain model from the LIDAR based digital surface model has show to be of great importance. Also the co-registration of the different data types shows to be a problem in practice. The artefacts resulting from this can be partially dealt with using mathematical morphology, but misregistration still accounts for a general degradation of the accuracy.

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