Automatic Extraction of Oblique Roofs for Buildings from Point Clouds Produced by High Resolution Colur-Infrared Aerial Images

Hayrettin Acar, Mehmet Ozturk, Fevzi Karsli and Mustafa Dihkan (Turkey)

Key words: Photogrammetry; Remote sensing; "building extraction, oblique roof points, dense image matching"

SUMMARY

Automatic creation of the 3D city models and keeping up to date are important topics in many disciplines. Generating the 3D city models quickly and automatically depends on producing some of models' details (buildings, vegetation, roads etc.) and digital elevation model. Nowadays, the aerial laser scanner system and the aerial imaging technologies are preferred for collection of the digital elevation models and 3D city model details.

This study presents an automatic detection technique for extraction of building oblique roof and vegetation from dense image matching point clouds by Semi Global Matching (SGM) algorithm applied on high resolution colour-infrared (CIR) digital aerial images. The high resolution (GSD 8 cm) colour-infrared images from Vaihingen-Data Set (ISPRS benchmark Project, consisting of historic buildings with roads and trees) were used for producing the coloured 3D point clouds by SGM.

The study consists of three steps; firstly, the vegetation points were detected by using NDVI mask from the infrared-coloured 3D point clouds. Then, the bare-earth points were extracted by Progressive TIN densification algorithm from the 3D point clouds that have been eliminated the vegetation points. As a final step, the oblique roof planes were obtained by Random Sample Consensus (RANSAC) from the latest point cloud without the vegetation and the bare-earth points. The results were evaluated by comparing to manually acquired reference building data. Three quality measures (Completeness, Correctness, Quality) were used for accuracy assessment. According to the quality measures, the proposed algorithm is successful for automatic extraction of oblique roof planes.