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3D RECONSTRUCTION OF BUILDINGS WITH GABLED AND HIPPED STRUCTURES USING LIDAR DATA

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Abstract. Buildings are the most important objects in urban areas. Thus, building detection using photogrammetry and remote sensing data as well as 3D model of buildings are very useful for many applications such as mobile navigation, tourism, and disaster management. In this paper, an approach has been proposed for detecting buildings by LiDAR data and aerial images, as well as reconstructing 3D model of buildings. In this regard, firstly, building detection carried out by utilizing a Supper Vector Machine (SVM) as a supervise method. The supervise methods need training data that could be collected from some features. Hence, LiDAR data and aerial images were utilized to produce some features. The features were selected by considering their abilities for separating buildings from other objects. The evaluation results of building detection showed high accuracy and precision of the utilized approach. The detected buildings were labeled in order to reconstruct buildings, individually. Then the planes of each building were separated and adjacent planes were recognized to reduce the calculation volume and to increase the accuracy. Subsequently, the bottom planes of each building were detected in order to compute the corners of hipped roofs using intersection of three adjacent planes. Also, the corners of gabled roofs were computed by both calculating the intersection line of the adjacent planes and finding the intersection between the planes intersection line and their detected parcel. Finally, the coordinates of some nodes in building floor were computed and 3D model reconstruction was carried out. In order to evaluate the proposed method, 3D model of some buildings with different complexity level were generated. The evaluation results showed that the proposed method has reached credible performance.