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Raster Vs. Point Cloud LiDAR Data Classification

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Abstract. Airborne Laser Scanning systems with light detection and ranging (LiDAR) technology is one of the fast and accurate 3D point data acquisition techniques. Generating accurate digital terrain and/or surface models (DTM/DSM) is the main application of collecting LiDAR range data. Recently, LiDAR range and intensity data have been used for land cover classification applications. Data range and Intensity, (strength of the backscattered signals measured by the LiDAR systems), are affected by the flying height, the ground elevation, scanning angle and the physical characteristics of the objects surface. These effects may lead to uneven distribution of point cloud or some gaps that may affect the classification process. Researchers have investigated the conversion of LiDAR range point data to raster image for terrain modelling. Interpolation techniques have been used to achieve the best representation of surfaces, and to fill the gaps between the LiDAR footprints. Interpolation methods are also investigated to generate LiDAR range and intensity image data for land cover classification applications. In this paper, different approach has been followed to classifying the LiDAR data (range and intensity) for land cover mapping. The methodology relies on the classification of the point cloud data based on their range and intensity and then converted the classified points into raster image. The gaps in the data are filled based on the classes of the nearest neighbour. Land cover maps are produced using two approaches using: (a) the conventional raster image data based on point interpolation; and (b) the proposed point data classification. A study area covering an urban district in Burnaby, British Colombia, Canada, is selected to compare the results of the two approaches. Five different land cover classes can be distinguished in that area: buildings, roads and parking areas, trees, low vegetation (grass), and bare soil. The results show that an improvement of around 10 % in the classification results can be achieved by using the proposed approach.

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