

Research on some data classification techniques applied to LIDAR point cloud classification

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Abstract: This study investigates several data classification techniques for the classification of LIDAR point clouds. Point cloud data, characterized by its irregularity, high density, and complex spatial relationships, presents significant challenges for automated classification. The research evaluates and compares the performance of traditional machine learning methods, such as Random Forest and Support Vector Machines, against advanced deep learning architectures, including PointNet and its variants. Key features derived from geometric, radiometric, and multi-scale neighborhood analysis are extracted to enhance classification accuracy. Experimental results on benchmark datasets demonstrate that deep learning models, particularly those incorporating local geometric structures, significantly outperform conventional classifiers in distinguishing complex urban and natural scenes, such as buildings, vegetation, and ground surfaces. However, the study also highlights the computational cost and data requirements of deep learning approaches. The findings provide a comprehensive framework for selecting appropriate classification techniques based on specific application requirements, contributing to more efficient and accurate LIDAR data processing for applications in remote sensing, autonomous navigation, and urban planning.

Keywords: data classification, LIDAR point cloud, classification techniques, spatial data processing