**Title**

A deep learning method for 3D point cloud segmentation of building facades

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**Abstract**

Semantic segmentation, a task vital in the creation of 3D point cloud models for buildings, is aimed at assigning meaning to individual points. However, due to the vast volume of unstructured point cloud data, precise semantic segmentation remains challenging. Significant progress has been observed in recent years with the application of deep learning techniques to point cloud segmentation, and the effectiveness of Dynamic Graph Convolutional Neural Network (DGCNN) and K-Nearest Neighbors (K-NN) in handling point cloud data has been recognized.  
In this study, Dynamic Graph Convolutional Neural Network (DGCNN) was utilized for semantic segmentation on a building's point cloud scene. We adopted K-Nearest Neighbors (K-NN) as a crucial component of our methodology to optimize the segmentation process. By varying 'k' values in K-NN and exploring different block sizes, we aimed to obtain various segmentation results for comparison. When a block size of 1 meter was employed and 'k' was set to 20, an overall accuracy of 90.32%, mean accuracy of 87.64%, and IoU of 80.71% were achieved. However, the most favorable segmentation outcomes were observed when the block size remained 1 meter, and 'k' was set to 30, resulting in an overall accuracy of 93.86%, mean accuracy of 90.68%, and IoU of 84.97%.  
These experiments underscore the significance of parameter selection in optimizing the performance of DGCNN for point cloud segmentation. The findings reveal that adjustments to 'k' values and block sizes can significantly influence segmentation accuracy and quality, emphasizing the importance of parameter optimization in the context of semantic segmentation for building point clouds using deep learning techniques. The utilization of K-NN played a crucial role in achieving these improvements by allowing us to adapt to the inherent variability in point cloud data.