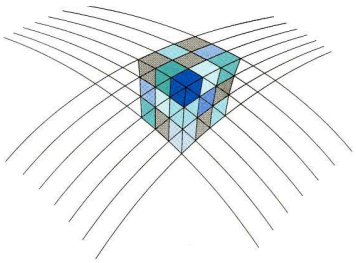

NCG

Netherlands Center for Geodesy and Geo-informatics

Abstract submission for the NCG Symposium 2020

Abstract submission deadline: 24 August 2020
Please submit your abstract EasyChair
https://easychair.org/conferences/?conf=ncg2020

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Presentation title: Assessing PointCNN for Semantic Segmentation of Indoor Scene (Case Study: Dutch Railway Station)

Demo: yes/no (Yes)

Abstract (~100 words and optionally 1-2 figures):
Point cloud data are inherently embedded in 3D space and has rich semantic representations. However, they are unordered and anisotropically distributed, thus being unsuitable for a typical CNN to handle. In this paper, we apply a neural network, PointCNN, for semantic segmentation of point cloud data and implement it to an indoor scene, namely the Amersfoort railway station, which consists of objects such as the entrance gates, ticket machines, benches, information boards, etc. The objects in the railway station are different from the common indoor scenes in currently available datasets. In this case, we label the data of the railway station in six different classes, excluding the unclassified ones. As for the experiment, we use subsets from the data, remove the noise from these, and train with separating the training and testing set. The results indicate that PointCNN demonstrates its strength with less noise and a more balanced class distribution. In the testing stage, it is capable of classifying garbage can and bench with precisions of 93% and 79% respectively. Based on the experiment, the quality of the data, the labelling task, and the proportion of the number of points per class all affect the performance significantly. The adaptability is also heavily dependent on the training location. The overall aesthetic of the train station makes a trained network for one location less suitable for another location.

Keyworrds: point cloud, deep learning, indoor scene, semantic classification, PointCNN

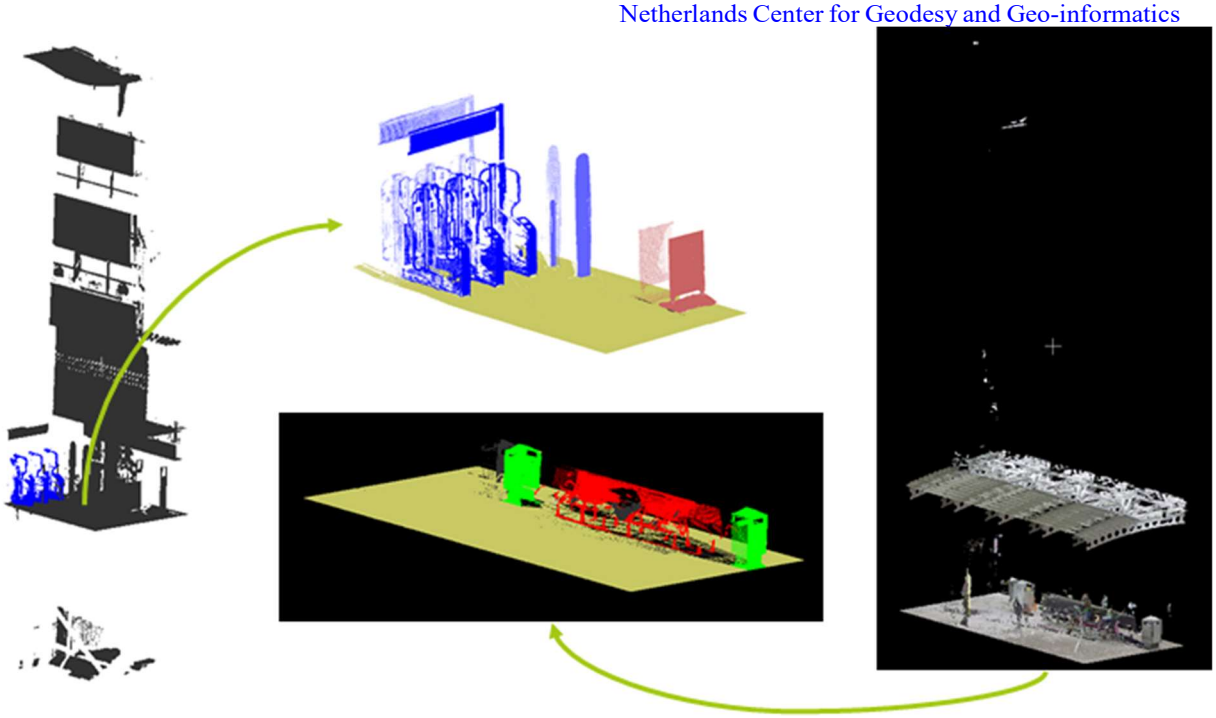
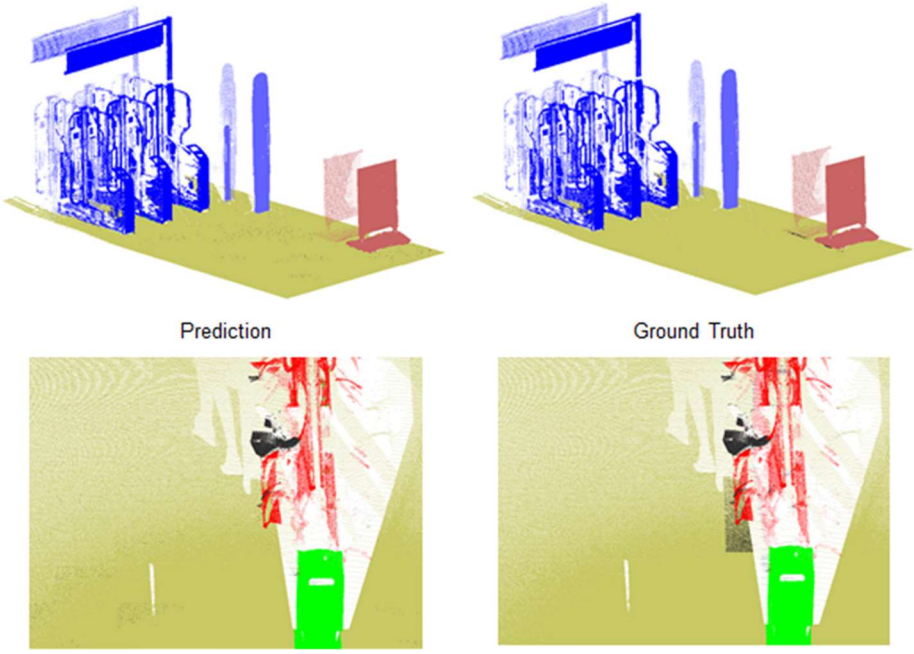
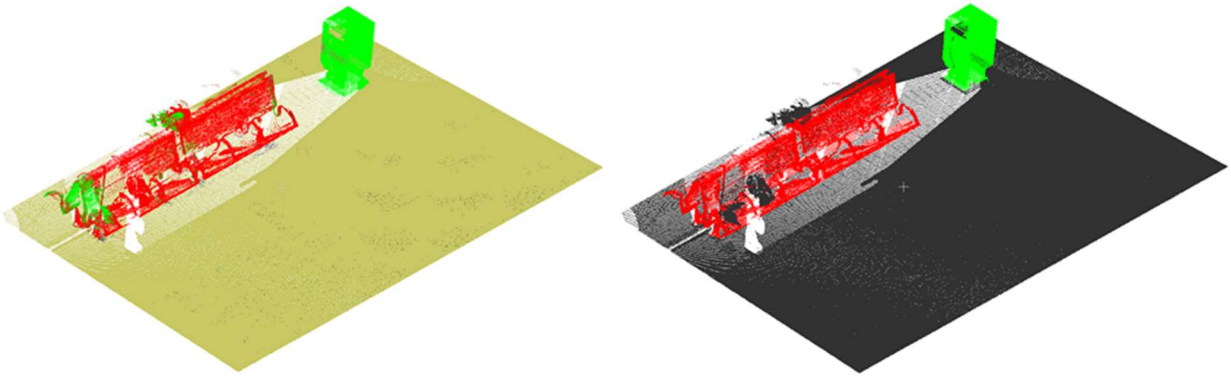


Figure 1. Data subset



Classes / Metrics	Class Precision	Class IoU
Garbage can	0.97	0.96
Couch	0.98	0.91
Entrance gate	0.99	0.98
Floor	0.98	0.97
SOS pole	0.99	0.99
Info boards	0.99	0.96

Figure 2. Test on train data sets



Metrics / Classes	Garbage can	Couch
Class Precision	0.93	0.79
Class IoU	0.92	0.62

Figure 3. Test on different data set. In the ground truth, the floor was still labeled as unclassified.