

Modeling:	<input type="checkbox"/>
Mathematics:	<input type="checkbox"/>
Programming:	<input type="checkbox"/>
Science:	<input type="checkbox"/>

Software Lab:

Point cloud segmentation by deep learning and automatic 3D reconstruction

Description

A regular updated 3D digital model of buildings can provide value to all stakeholders. However, currently it still requires much human effort to reconstruct these models from point clouds. In order to reduce the human effort in this process, an automatic or semi-automatic method is desirable, which includes point cloud segmentation, extracting parameters of elements, reconstruction models in modeling software.



Figure 1: Input point cloud

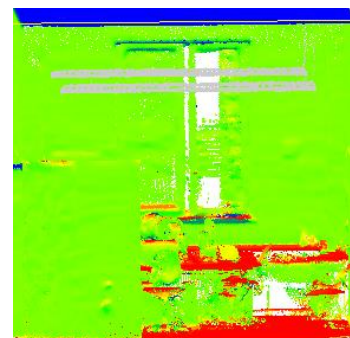


Figure 2: Segmentation result

Task

In this project, the overall goal is to create an end-to-end pipeline that includes the following steps:

- Point cloud segmentation by deep learning [1],
- Fitting geometric primitives to point clouds,
- Extract parameters of target components (such as slabs, columns, and beams) and write the parameters in a suitable transfer representation (like .json, .xml),
- automatically reconstruct elements using Revit API and Cloud-based Design Automation [2, 3].

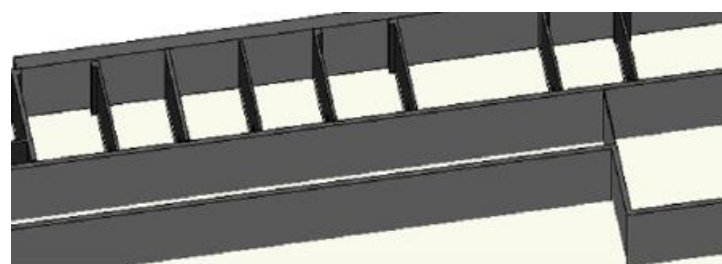


Figure 1: 3D model in Revit

Supervisor

Yuandong Pan, Chair of Computational Modeling and Simulation, yuandong.pan@tum.de

Sebastian Esser, Chair of Computational Modeling and Simulation, sebastian.esser@tum.de

References

[1] Guo, Yulan, et al. "Deep learning for 3d point clouds: A survey." IEEE transactions on pattern analysis and machine intelligence (2020).

[2] <https://www.revitapidocs.com/>

[3] https://forge.autodesk.com/en/docs/design-automation/v3/developers_guide/overview/