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Software Lab:

Modeling:
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MUBLayout3D - Generating 3D Layout of Mixed-use Building from 2D Floorplan Images

Description

The task of transforming 2D architectural building layouts into 3D representation has been intensively researched in computer vision and pattern recognition. However, most research in the past has focussed on the residential-scale floorplan ignoring the Mixed-use building (MUB) layouts (e.g., transit hubs, educational buildings, shopping malls, museums, hospitals). A mixed-use building seeks to combine multiple building functionalities into one structure and enables large crowds of occupants to meet and move about, which are relatively less studied. This project will investigate data-driven (ML) and heuristic-based design alternatives studied in the past in converting the 2D floorplan into a 3D model and propose a framework MUBLayout3D. MUBLayout3D will provide an end-to-end model that will take an input architectural floorplan consisting of various structural and auxiliary information objects, such as walls, doors, windows, rooms, atria, sink locations (lifts, staircases, entrances, exits) and output a 3D model of the same.
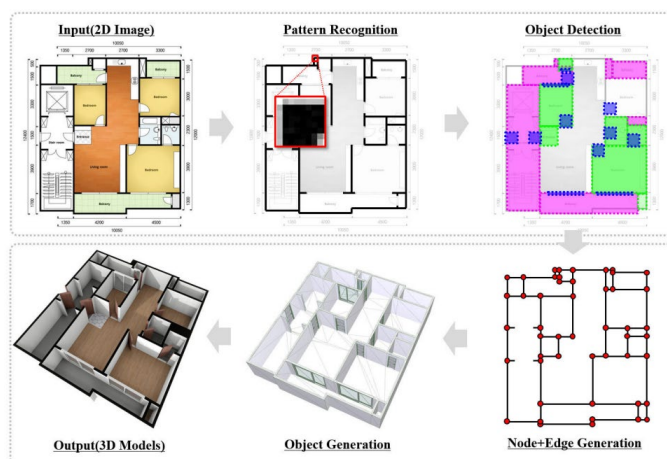

Figure 1: From 2D raster floorplan into 3D vector models [1]

Task

To develop a framework that generates 3D layout of mixed-use buildings from 2D floorplan Images

- Perform literature review to identify state-of-the-arts ML and heuristic based methods that address similar research challenge.
- Collect a 2D floorplan images dataset for multiple building types (transit hubs, educational buildings, shopping malls, museums, hospitals).
- Implement algorithms that performs the task described in Figure 1.

Supervisor

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References

[1] Park, S., & Kim, H. (2021). 3DPlanNet: Generating 3D Models from 2D Floor Plan Images Using Ensemble Methods. Electronics, 10(22), 2729.