Findings on Converting 2D Floorplan Images to 3D Models

1. 3DPlanNet Model

Overview:

- A model designed to address limitations of heuristic-based and deep learning methods for 3D floorplan reconstruction.

Advantages:

- Improved accuracy compared to previous deep learning methods.
- Utilizes a relatively small training dataset of 30 floorplan images.

Model Architecture:

- Ensemble model combining data-based and heuristic-based approaches.
- Data-based model for pattern recognition and object detection.
- Heuristic-based model for node, edge, and object generation.

Challenges:

- The paper is available online, but the code is not available, so I could go for further exploration and implementation.

2. Plan2Scene Model

Overview:

- Focuses on texturing floor, wall, and window surfaces rather than direct conversion of 2D to 3D.

Steps:

- Lifts a floorplan image to a 3D mesh model.
- Synthesizes surface textures based on input photos.
- Infers textures for unbounded surfaces using a graph neural network architecture.

Challenges:

- Conversion from raster image to vectorized image.
- Generation and placement of fixed 3D objects (e.g., doors, windows) using a rule-based approach.

Overall:

- Open-source code available, but issues with package functionality and implementation.

3. Instant Mesh

Overview:

- converts 2D images or sketches into basic 3D geometry (like depth maps or voxel-based representations) and then refine that geometry into a more detailed and clean 3D mesh using its automatic remeshing and editing capabilities.

Advantages:

- It produces high-quality 3D meshes that contains many details.
- It works with only one 2D image as input.

Model Architecture:

- Input processing: Parsing and interpreting input data, such as 2D images or sketches.
- Mesh generation: Generating an initial 3D geometry representation from the input data.
- Remeshing and refinement: Automatically refining the initial geometry into a clean quad mesh, using algorithms for mesh optimization and topology adjustment.
- Interactive editing: Providing tools for users to interactively edit and refine the generated mesh as needed.

Challenges:

- It did not work properly with 2D floor images, the output is shown in the figure below: