



Procedural Modeling for Architecture

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Abstract:

This project generates building models from elements provided by the user through a variety of methods.

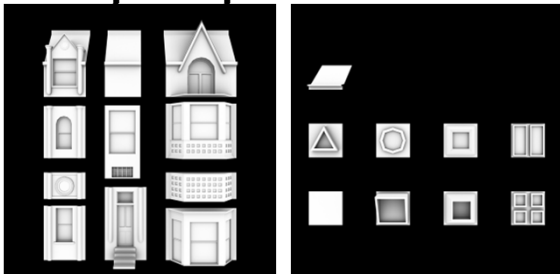
Goals:

- Generated buildings must be sufficiently realistic to be believable
- Generated buildings must have sufficient variety to decrease modeling workload

Execution:

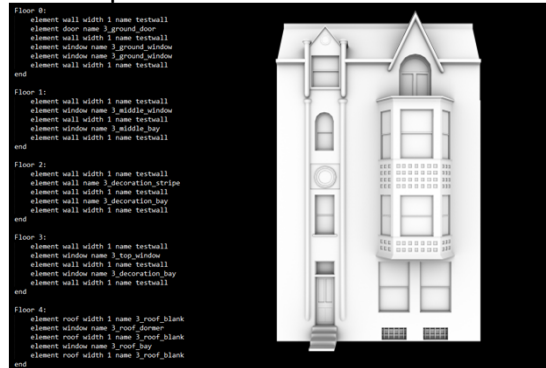
The user models a set of input tiles, then specifies a direct input scheme or grammar and footprint polygon. Direct input is followed explicitly with tiles positioned and scaled to match in height while filling out rows. Grammars first create string, following provided rules. Terminal symbols are mapped to geometric elements and those are then arranged following the generated strings. The starting point and other formatting data are set with reserved symbols.

Example Input Tiles:

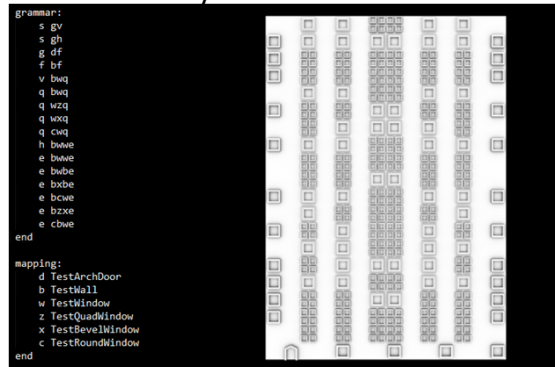


Example Use:

Direct Specification:



Grammatical System:

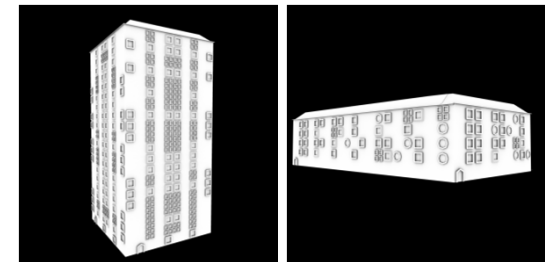


Workflow:

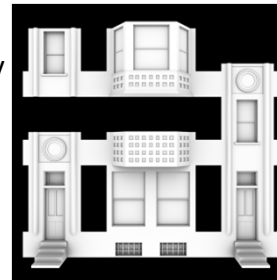


Conclusion:

- Architectural principles such as symmetry and rhythm can be codified with formal grammars.
- Flexible grammars combined with user modeling can create a wide variety of buildings.



Simulated annealing can be tailored to address any issues resulting from grammatical generation. These could include second floor doors and mismatched roofs.



Future Work:

- Extend annealing toolset to resolve a wider range of conflicts
- Extend program to handle whole blocks with building divisions
- Add support for complex roof structures