

Procedurally Generating Interesting Structures in 3D Video Games

The level design phase in video games is laborious process, requiring designers to place object manually within a 3D environment. This work seeks to automate this process by providing a solution that uses procedural generation methods to populate game levels with structures in a cohesive and interesting manner.

Minecraft was chosen to be the target 3D environment of this project on account of its widespread popularity and its voxel-based graphics allowing expressive manipulation of the scenery. A custom tool was developed to parse an input paragraph describing a scene, such as "A tall oak tree near a brick house, on top of a mountain," and generate the appropriate geometry accordingly. To this end, a Domain Specific Language was created to define structures in terms of geometric primitives, other structures, and operations on and between them. A dedicated library was then implemented to enable the computation of geometry in terms of the positions and materials of individual voxels. Finally, the Spigot Server application [1] was employed, in combination with the MCPI Python Plugin [2], to generate the final scene in the game's 3D environment.

The system was tested given a number of diverse and complex prompts and the resulting output was evaluated according to a number of objective and subjective criteria.