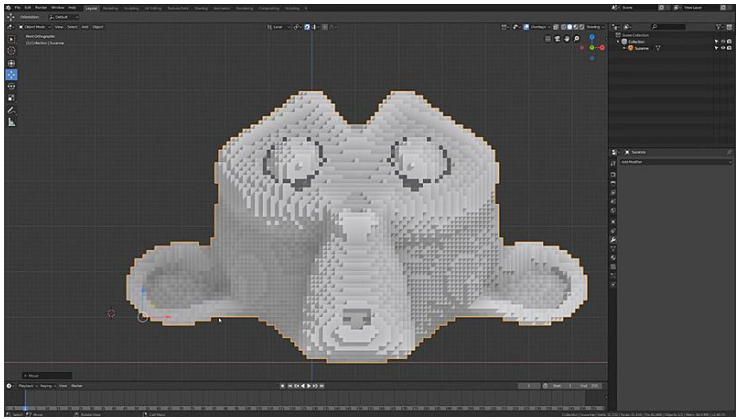
Halfedge Mesh Voxelizer, Constantin Geier

Individual project pitch, Geometry Processing

Motivation



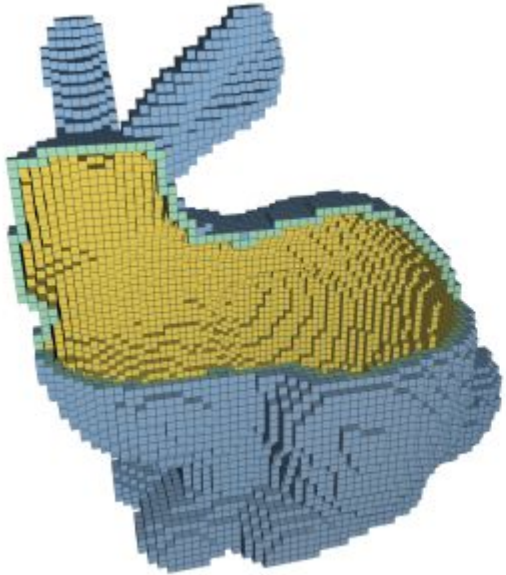
Voxelizing mesh in Blender

Simulation using Voxels (NVIDIA)

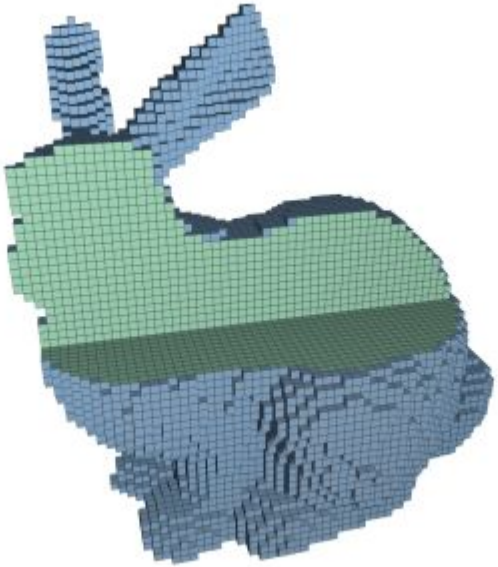
https://www.youtube.com/watch?v=CnwVtuam-28&list=TLGG8DQMXmzPxWQxMDAxMjAyMg&t=38s

https://cgcookie.com/course/creating-detailed-voxel-art-in-blender

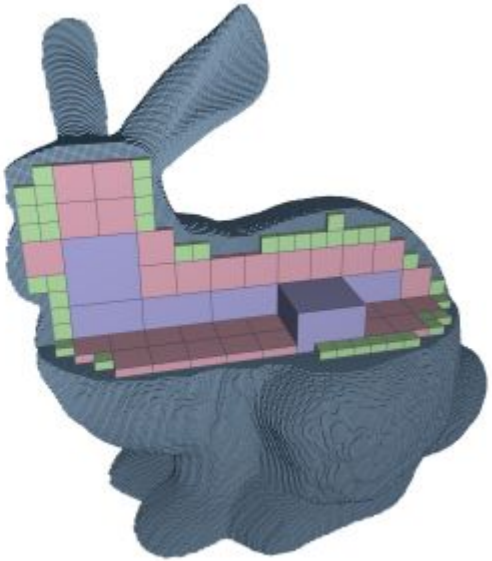
Voxel representations



Surface voxelization



Solid voxelization



Octree-based solid voxelization

http://research.michael-schwarz.com/publ/2010/vox/

Proposal

Implement algorithm that voxelizes a mesh into cubes / point cloud

-> Input: mesh represented by half edge data structure (h.e.d.s)

-> Using .ts instead of c/c++

-> make use of properties of h.e.d.s like fast access to neighbour faces

Visualize results using the template from our exercises

Make specific parameters (resolution) user-selectable

Optional: Coloring the resulting voxel representation,calculating normals,

conservative overlap

References

Bronson zegeb, https://bronsonzgeb.com/index.php/2021/05/15/simple-mesh-voxelization-in-unity/ Blender, https://docs.blender.org/manual/en/latest/sculpt_paint/sculpting/tool_settings/remesh.html karimnaji, https://github.com/karimnaaji/voxelizer Guangming, Li, et al. "A new mesh simplification algorithm combining half-edge data structure with modified quadric error metric." Object recognition supported by user interaction for service robots. Vol. 2. IEEE, 2002. https://images-insite.sgp1.digitaloceanspaces.com/dunia_buku/koleksi-buku-lainnya/a-new-mesh-simplification-algorithm-combining-half-edge-data-structure-with-modified-quadric-pdfdrivecom-2881581480755.pdf

References (Images in presentation)

voxel_blender https://cgcookie.com/course/creating-detailed-voxel-art-in-blender
Nvidia_voxels_sim https://www.youtube.com/watch?v=CnwVtuam-28&list=TLGG8DQMXmzPxWQxMDAxMjAyMg&t=38s

rabbit_vox_1 http://research.michael-schwarz.com/publ/2010/vox/