

Exercise

Extract a mesh from a voxel grid
Visualize and edit it on Blender

Repository: <https://github.com/c-h-benedetti/workshop-3d-surfaces/tree/master>

Prerequisites

- Download Blender 4.1.1 from download.blender.org/release/Blender4.1/
- Unzip the archive and make sure that you can run Blender.
- Install the module "PyMeshLab" with the "install-modules.py" script.
- Install the add-on "formation_3d_addon.zip".

1. Voxels to mesh

1. Use Fiji to open the "Rascasse_140µm.tif" image that you downloaded.
2. We will now build an isosurface. In this exercise, we will base ourselves on the intensity to find the structure we are interested in. You can try to pick either the skeleton or the whole skin + the skeleton.
3. The marching cube is natively present in Fiji, and its result is exported in a ".obj" file. Once you finish making a mask from your image (by thresholding), you can go to File > Save As > Wavefront .OBJ

2. Use the mesh in Blender

1. You can now switch to Blender.
2. We want to start with an empty scene, so you can select everything (by pressing "a") and remove everything (by pressing "x"). The position of your mouse cursor is important on Blender. If you want to run an action on something in the viewport, your mouse must be over it.

3. Open the file through: File > Import > Wavefront (.obj) and pick your file.
4. To navigate in the 3D view of Blender, your right index finger should never leave the wheel of the mouse, and your left index finger should not leave the shift key:
 - a. wheel-click: orbit
 - b. wheel-click+shift: pan
 - c. wheel: zoom
5. Press the dot (.) from the numpad to center your view on the active object.
6. Pressing [N] will open the toolbox, in which, if the plugin is correctly installed, there should be a "Tools" tab.

- A. The first function "Simplify and smooth" removes one vertex out of two and interpolates the remaining vertices.
- B. "Keep largest islands" searches for the biggest connected component and discards all others, as they are certainly resulting from the noise.
- C. The "Curvature" creates a vertex attribute between 0 and 1 representing the local curvature at each vertex. You can display its result by passing in "viewport shading", in the upper-right corner of the viewer (the sphere with a chessboard pattern)