Feedback hw02

GEO1004.2025

#	33
avg	77%
median	83%
max	90%
min	30%

Hugo Ledoux (2025-06-10)

How did I mark

1. outputs `out.city.json`?
2. cjval `out.city.json` => errors
3. `rg "CGAL::area|CGAL::squared_area|CGAL::determinant|CGAL::normal|CGAL::volume|CGAL::Polygon_mesh_processing::approximate_Hausdorff_distance|CGAL::Polygon_mesh_processing::approximate_symmetric_Hausdorff_distance" --glob "*.cpp" --glob “*.hpp"`
4. Test with 3 datasets from Delft + Schiermonnikoog

Compiles + rules

- `std::ofstream o(“../../data/out-9-284-556.city.json");` ==> means you only tested with that one?
- remember the lectures of Bastiaan and me about standards? They are there for a reason: **volume22** and **volume_lod22** and etc are not recognised by my marking code. You should all have gotten zero but since I am a nice person I modified your code and you lost only 0.5 or 1.0 depending on the severity of the offence…

Volume

- volume of 3DBAG/Ravi is wrong (by a bit)! Not sure why yet... different method but that shouldn't be the issue. We're looking into it.
- "*To compute the volume of a building, it is necessary to have a perfectly closed (watertight) surface*"
- invalid geometries e303 == not sure for volume so that was not considered. If the code didn't crash then all good.
- No need to use val3dity the results is in the file in one attribute!
- "CGAL doesn't handle holes in meshes" ==> what does that mean?

https://x.com/keenanisalive/status/1595429344419217418

← **Post**

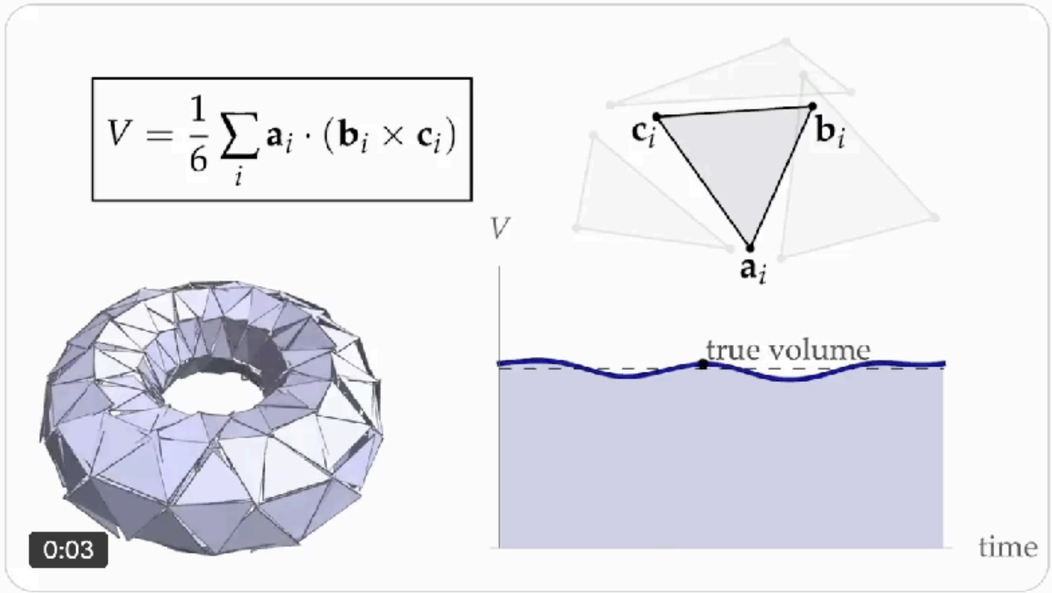
Keenan Crane ✓
@keenanisalive

Need the volume of a broken triangle mesh?

Don't bother fixing it.

Just sum over all triangles $(\mathbf{a}_i, \mathbf{b}_i, \mathbf{c}_i)$ the dot product of one vertex with the cross product of the other two, and divide by 6.

[Caveat: all normals must point out. Works even for nonconvex shapes!]



3:49 PM · Nov 23, 2022

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- each face could have been triangulated separately and just triangulate a polygon soup
- No need to create a full SurfaceMesh (which will crash if invalid input geoms…)

Volume

- volume of 3DBAG/Ravi is wrong (by a bit)! Not sure why yet... different method but that shouldn't be the issue. We’re looking into it.
- “*To compute the volume of a building, it is necessary to have a perfectly closed (watertight) surface*”
-

What else?

- no need to apply transform/translate and even transform/scale could in theory be split (but area and volume would need to take this into account)
- using (0,0,0) as the extra point for the tetrahedron can work but it could be VERY FAR AWAY if you applied the translation. If you didn't then fine it's a fine choice.
- “After the Hausdorff Distance was calculated, cjval was used to validate the validity of the output CityJSON. Initially it was invalid, but the AI platform Claude restructured the code properly when the input CityJSON inheritance structure was part of the prompt.”