Report, Kinetic project

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March 2024

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1 Objectives

the objective of the project is to process files in IFC format containing building meshes that are not hermetic in an algorithm repairing geometric error in a kinetic data structures.
In the first part of the project we need to repair building to make them watertight, keep the label of the differents materials. In the second part, we will need to use the algorithm on an urban model and ensure that adjacent buildings have no gaps between them.

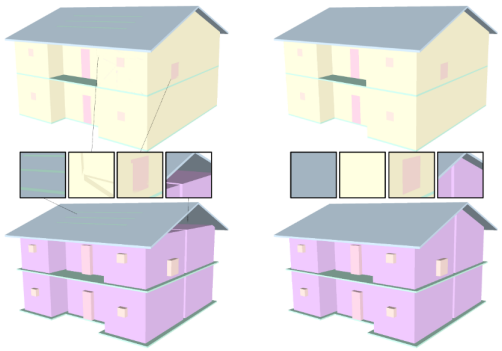
2 Tools

2.1 CGAL

CGAL is a package for geometry algorithms,offering differents data structure and algorithms to work on polygons,surface,mesh generation...

2.2 Kinetic

Kinetic algorithms is a package from CGAL, he permit to work on mesh with some hole in it . When applied on the mesh the Kinetic algorithms will 'prolonger' some surface to fill the mesh to make it waterproof. we can see here what the algorithm is capable of :



References

[1] Jean-Philippe Bauchet and Florent Lafarge. Kinetic Shape Reconstruction. *ACM Transactions on Graphics*, 2020.

[2] The CGAL Project. *CGAL User and Reference Manual*. CGAL Editorial Board, 5.6.1 edition, 2024.

[3] Mulin Yu, Florent Lafarge, Sven Oesau, and Bruno Hilaire. Repairing geometric errors in 3D urban models with kinetic data structures. *ISPRS Journal of Photogrammetry and Remote Sensing*, 192, October 2022.