Report, Kinetic project

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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.

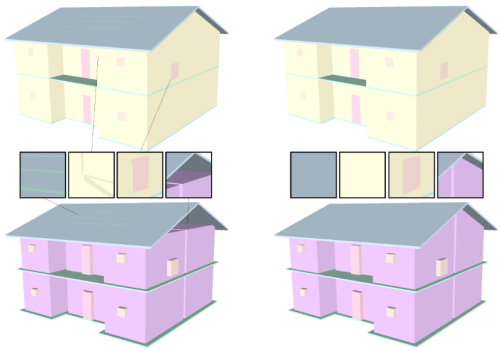
2 Tools

2.1 CGAL

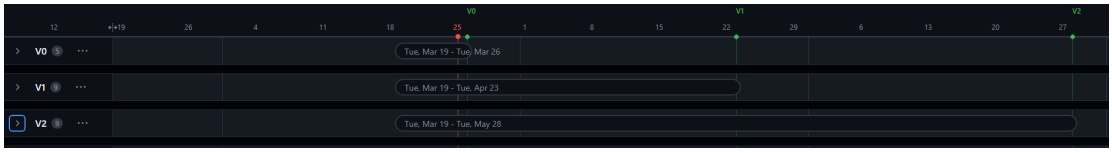
CGAL is a comprehensive package for geometry algorithms, providing various data structures and algorithms for working on polygons, surfaces, mesh generation, and more. It offers a wide range of functionalities for geometric processing and analysis in various fields such as computer graphics, computational geometry, and geometric modeling.

2.2 Kinetic

Kinetic algorithms is a package from CGAL that allows working on meshes with some holes in them. When applied to the mesh, the Kinetic algorithms will 'extend' some surfaces to fill the mesh and make it watertight. Here's what the algorithm is capable of:



We intend to work on this project in the coming months and will continuously update our progress as outlined in the following roadmap.



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.