Kinetic

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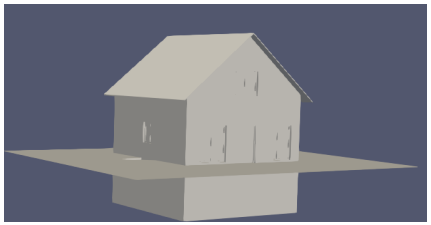
Introduction

Objectives

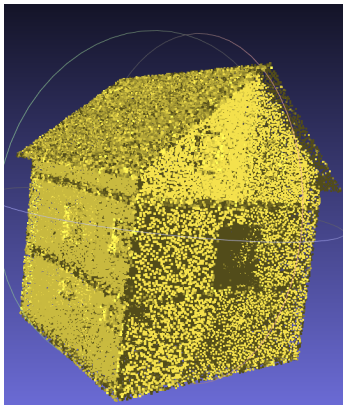
- **Reading Process and Mesh Conversion:** Convert data from stl file to ply and xyz file with normals on points
- **Application of the Kinetic Algorithm**
- **Recovery of Material Labels**
- **Utilization on City Modeling**

Challenges

- **Generating point cloud from stl file**



ACJasmin stl



ACJasmin point cloud

- **Parameter Optimization**

Cgal

- C++ library for geometric calcul
- Provides data structures and algorithms for:
  - Computational geometry
  - Mesh generation and processing
  - Geometry processing
  - Surface and volume manipulation
- For our usage Kinetic surface reparation algorithme, file reader

Kinetic Kinetic algorithm is an geometric algorithm to work on 3D mesh it uses geometric primitive with an energy based model to fit the primitives to the model.
Energy formule:

$$U(x) = w_f U_f(x) + w_s U_c(x) + w_c U_c(x)$$

to calculate the best primitive to fit the mesh. then we have a list of geometric operation on each primitive

- merging
- splitting
- transfer
- insertion
- exclusion

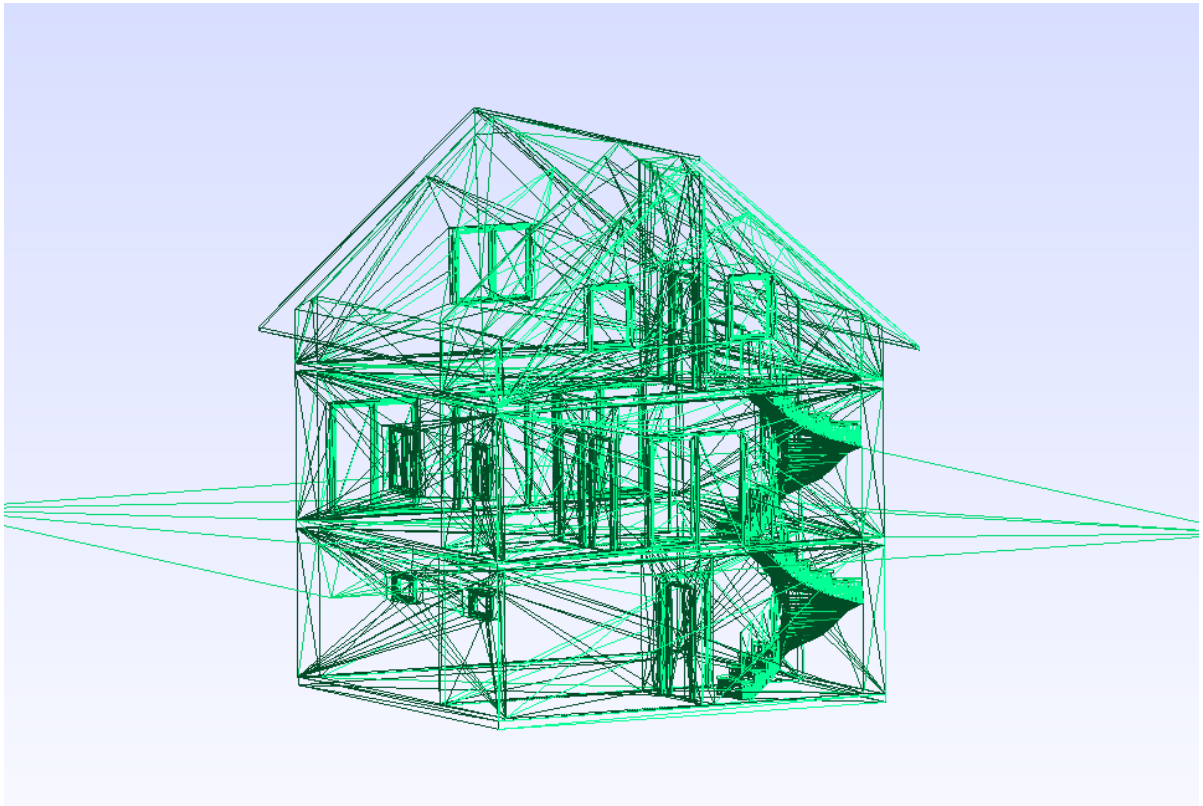
Here the speudo code of the application of geometric application :

Algorithm 1 Pseudo-code of the exploration mechanism

```
1: Initialize the primitive configuration x
2: repeat
3:     Initialize the priority queue Q
4:     while top operation i of Q decreases energy U do
5:         Update x by operation i
6:         Update Q
7:     end while
8:     Update x by the global transfer operator
9: until no update modifies x any more
```

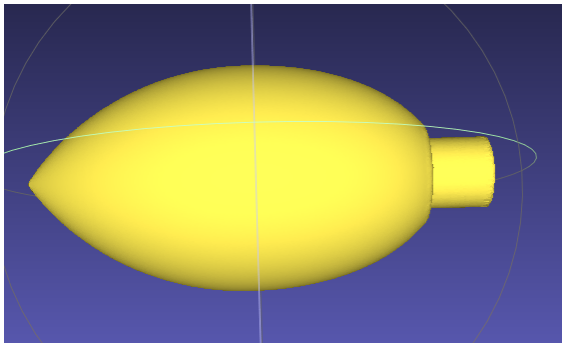
STL (STereoLithography)

- File format for 3D modeling
- Stock a collection of triangle composing the mesh without any other information

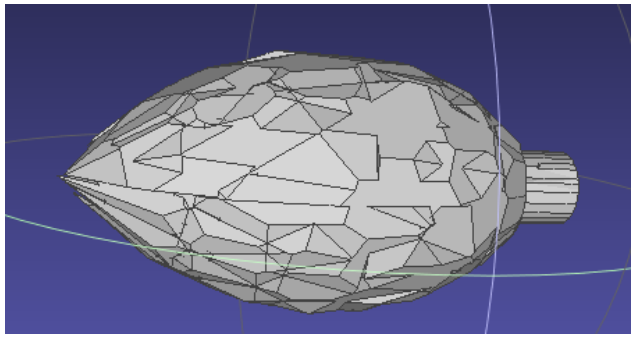


first result

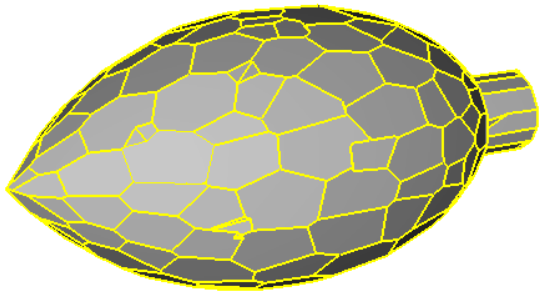
First we can show you what KSR algorithm is capable of:



point cloud



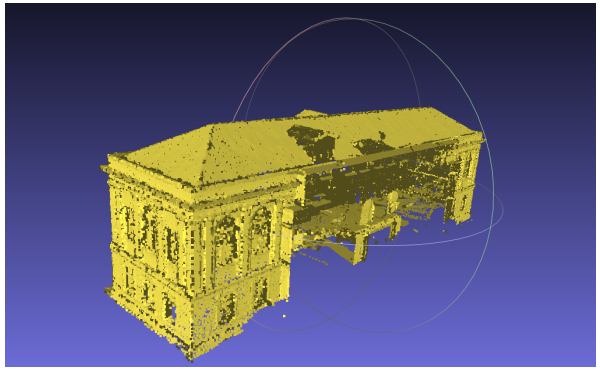
cgal result



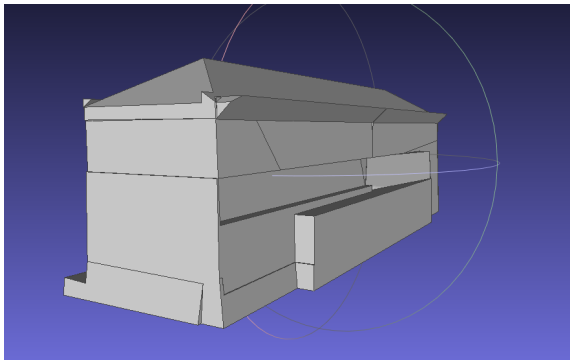
inria result

Figure: Visualization of results on a flame

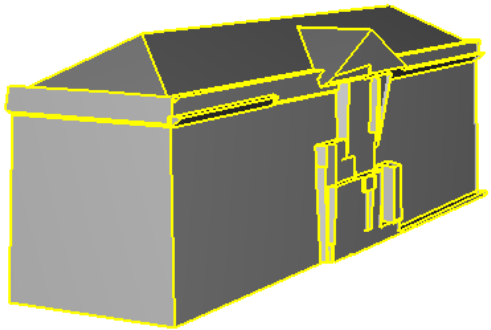
first result



point cloud



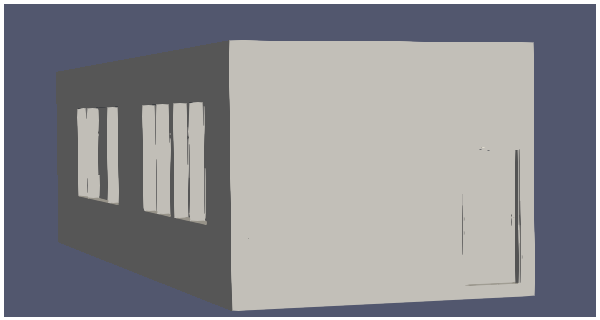
cgal result



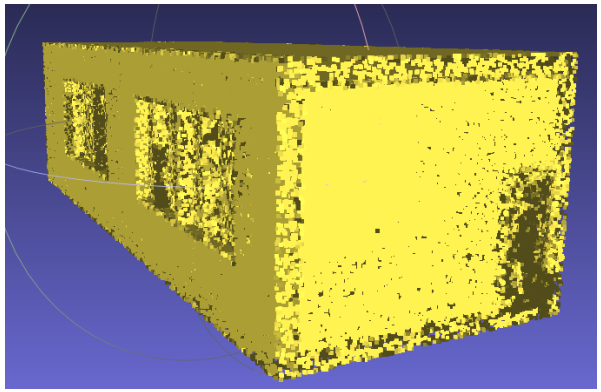
inria result

Figure: Visualization of results with a building

3zones example

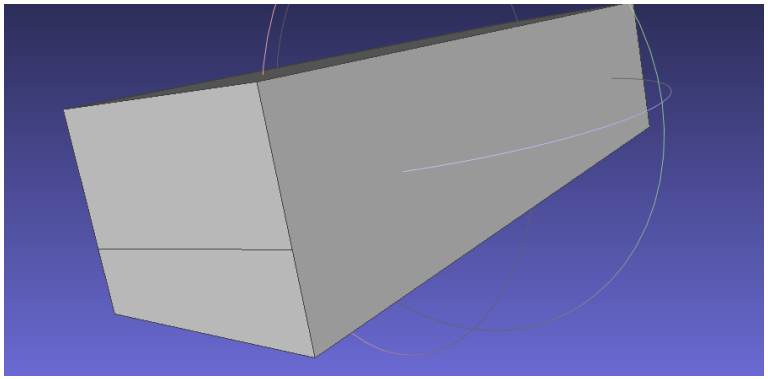


3zones

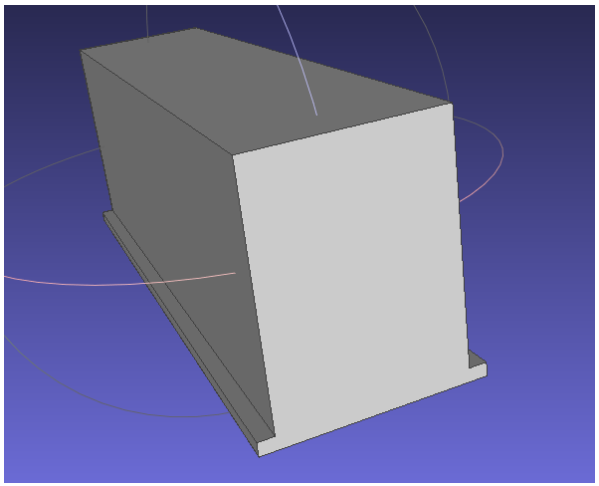


3zones point cloud

result

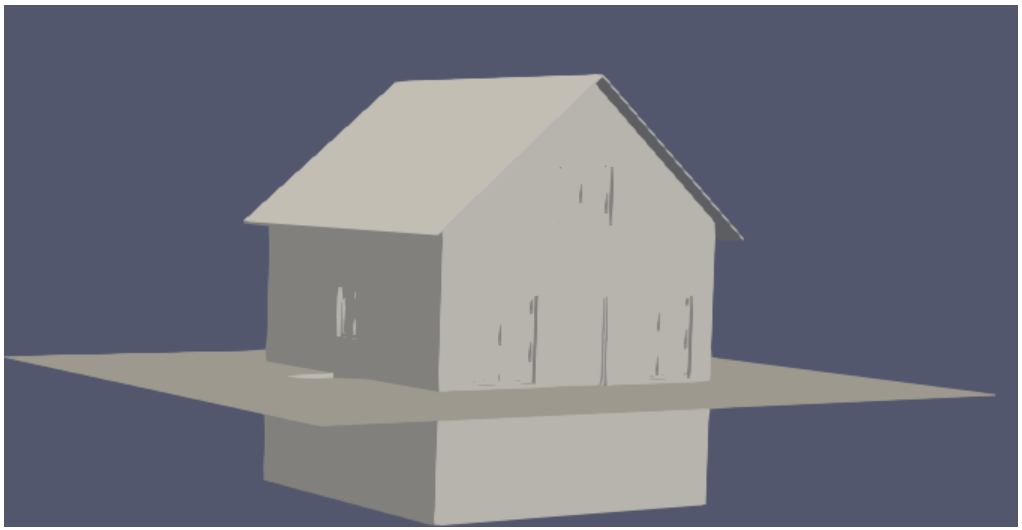


3zones result with normal by Meshlab

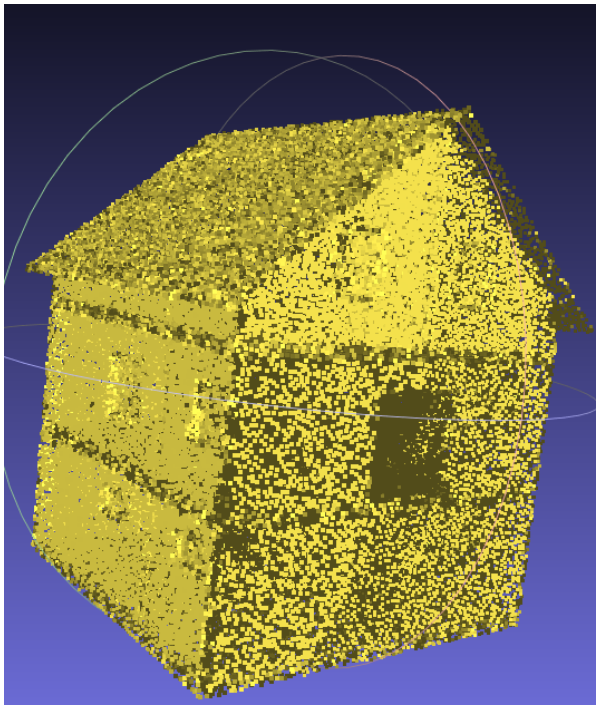


3zones result with normal by Cgal

ACJasmin example

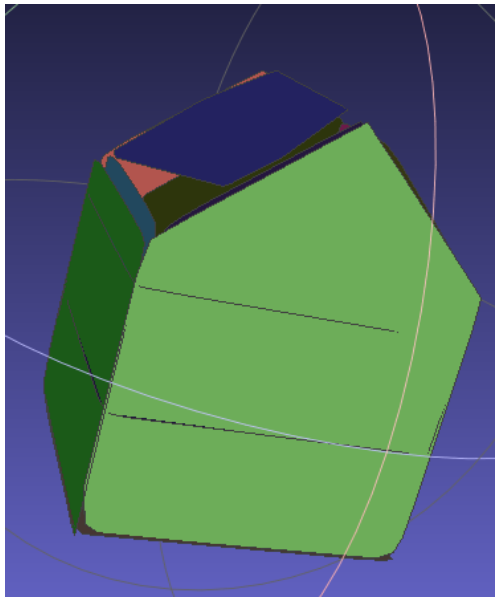


ACJasmin

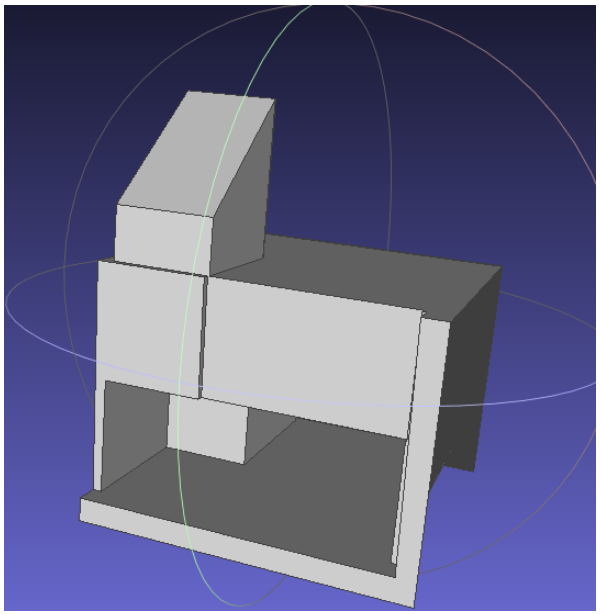


ACJasmin point clouds

cgal kinetic result



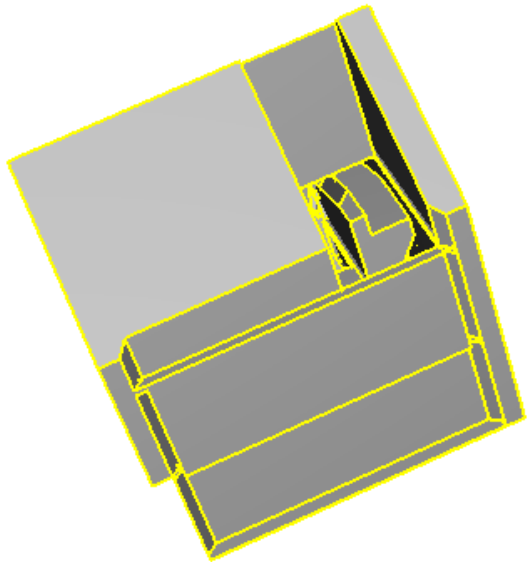
ACJasmin primitives by Cgal



ACJasmin result with Cgal

INRIA kinetic result

ACJasmin primitives by INRIA



3zones result with INRIA

reference I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