A mesh processing toolbox for geometrical acoustics

Amin Abbasloo
ITA at RWTH, Aachen Germany

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  Segmentation, Disassembling and Assembling
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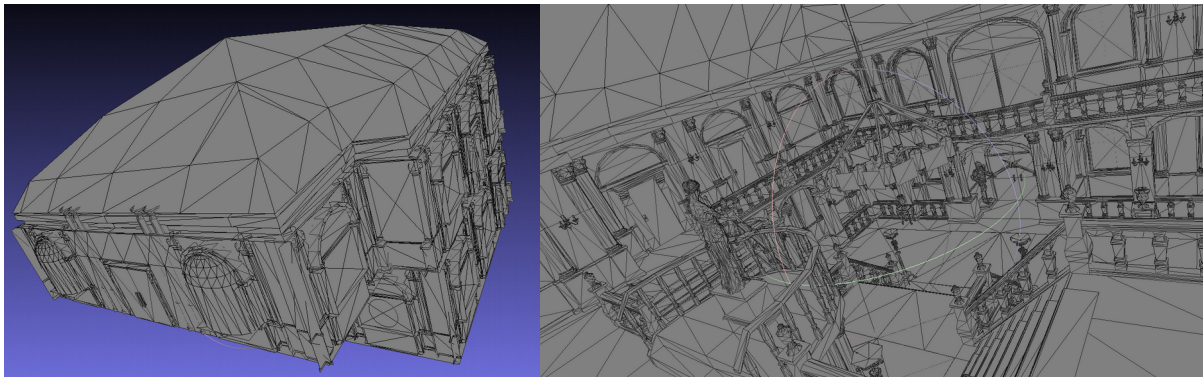
https://github.com/abbasloo/geoWrench

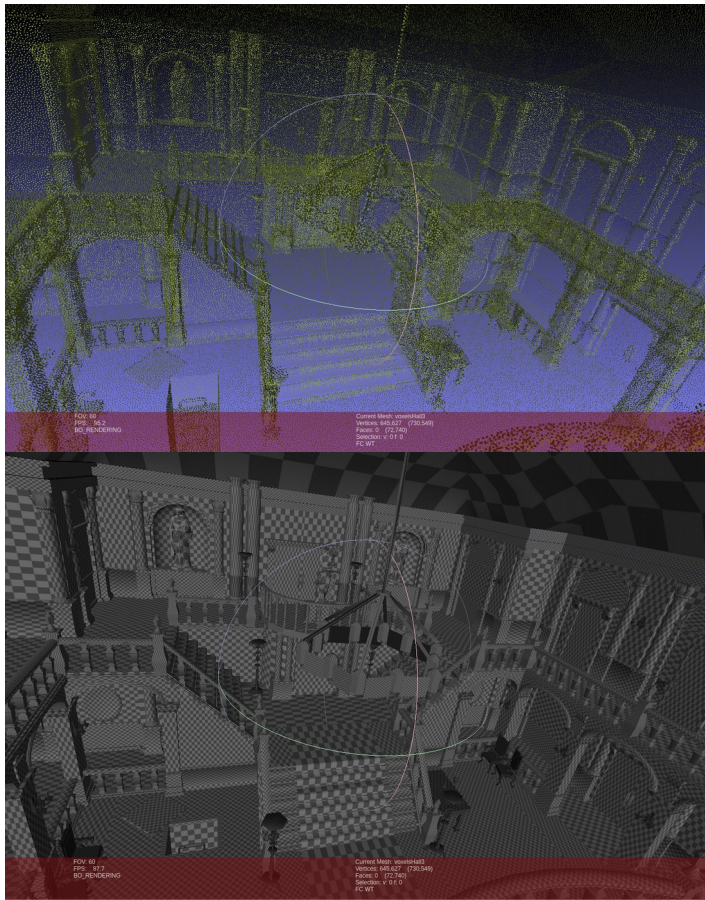
Introduction

- Data collection with scanner
- Data pre-processing (point cloud/mesh)
- Geometrical acoustic simulation
- Evaluation with real measurement
- Acoustic VR



Point Cloud and Mesh

- Raw data is an unorganized point cloud with/out texture(depends on scanner type)
- Registering echos/scans
- De-noising and cleaning
- Creating mesh/triangulation
- Model correction
- Texture and material assignment
- Saving in a standard format



Pipeline

- Segmentation (region growing) gives
  parts and features

- Disassembling
  part/structure recognition and simplification

- Assembling

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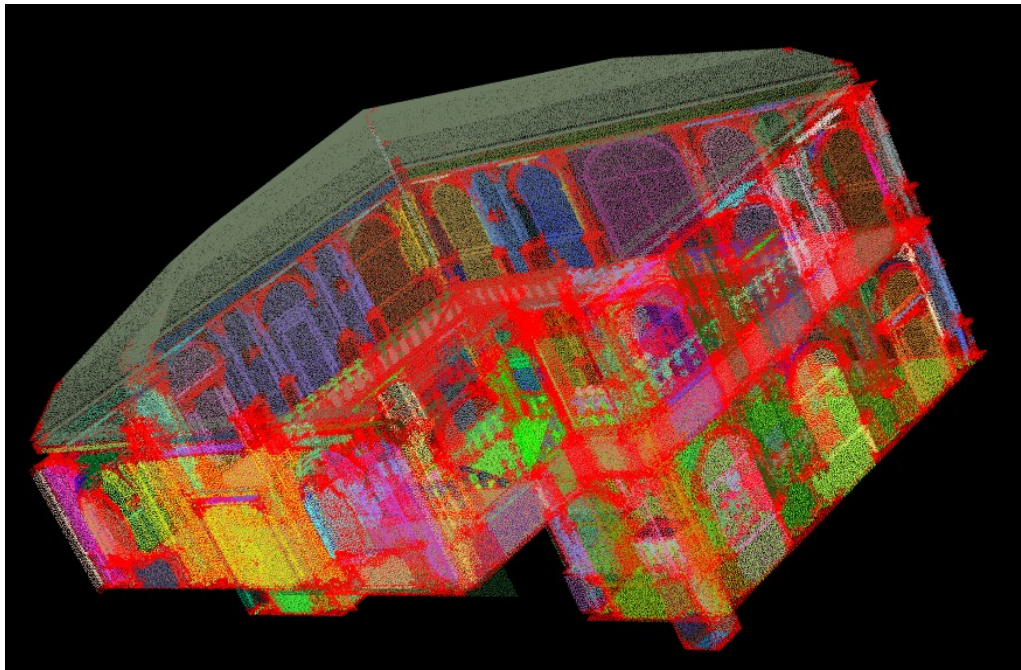
Segmentation

- Region growing segmentation for point clouds
- fix some thresholds

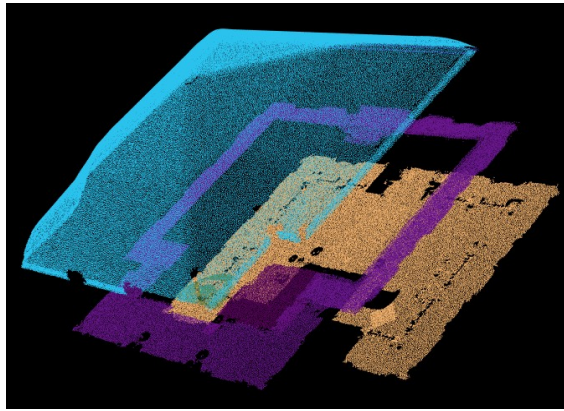
- Parts with smooth surfaces
  plane and dome

- Features for each part
  means, eigenvalues and neighbors



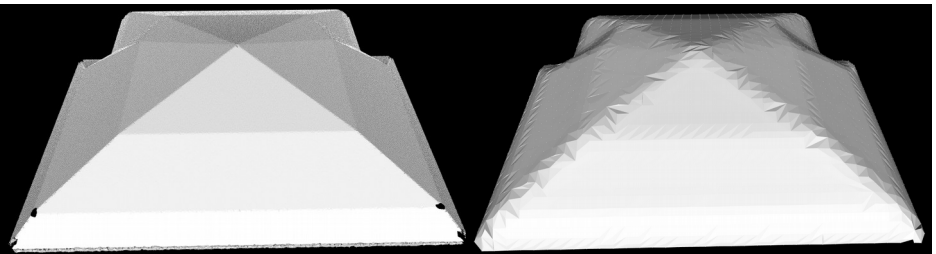
Disassembling

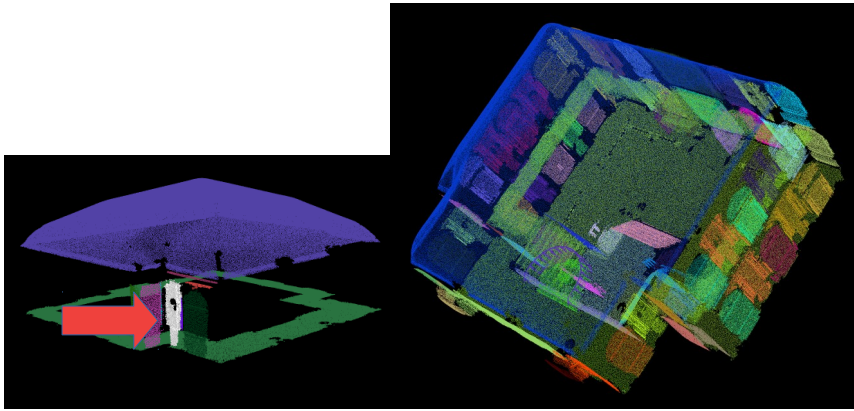
- Structure recognition based on features
- rule-based



- Exteriors (ex-walls, floors and roof)
  makes a watertight box!

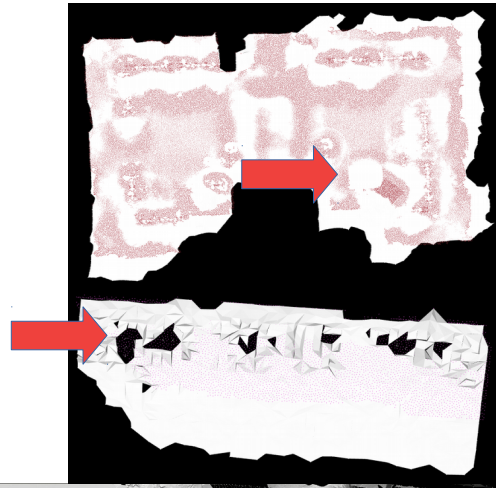
- Simplification/Meshing
  spatially uniform

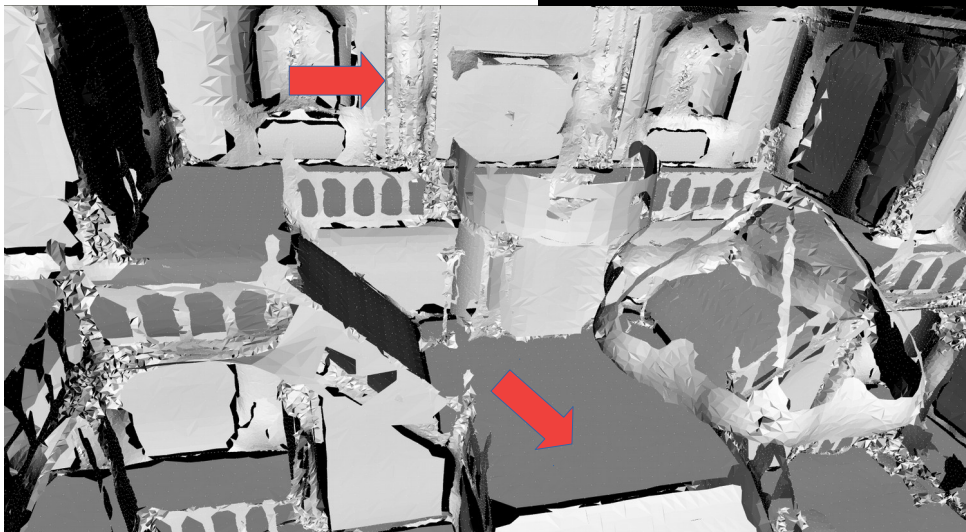




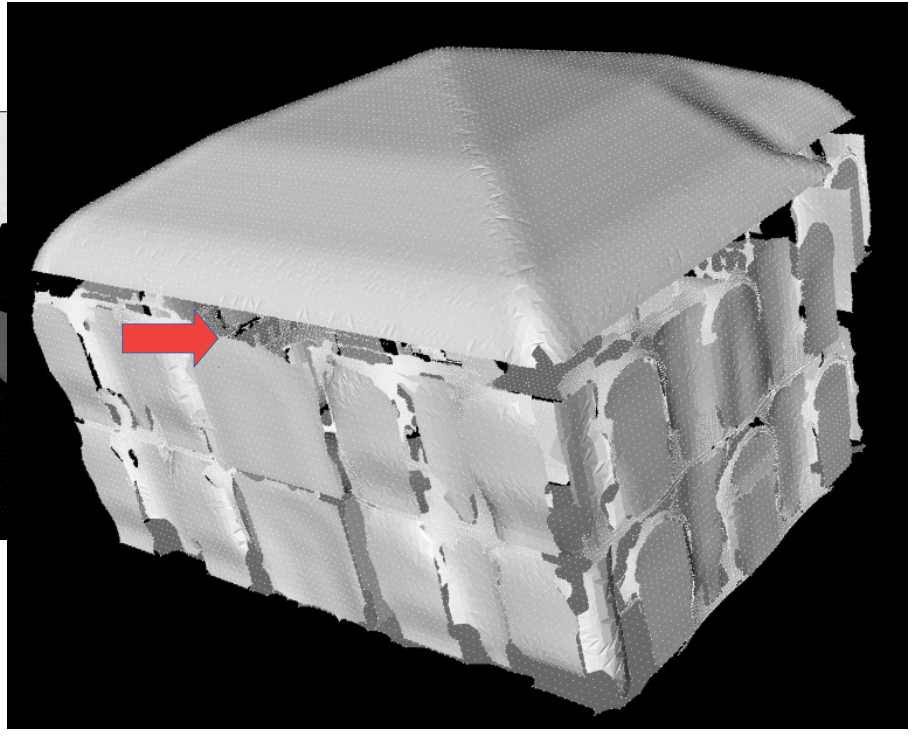
Assembling

- Hole filling or part healing
  region growing for boundaries
- Parts meshing/triangulation
  simple and fast usually for planes
- Putting parts (meshes) together
  exteriors is a watertight mesh
  the rest are not connected meshes





Result and Discussion



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Future Plans

- Improving and including
  hierarchical segmentation, structure recognition (exteriors), edge growing healing, sampling and part meshing (watertight exteriors).

- A few theses and feedback!

- Open source software/bring it to BIM format!

- GUI?

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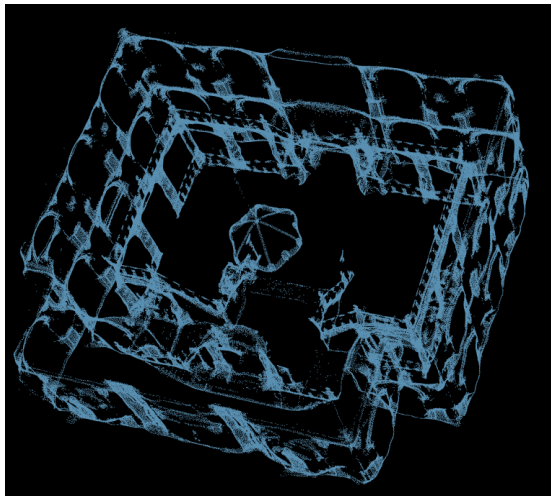

Q&A