





Object detection on highways with point cloud data

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Outline

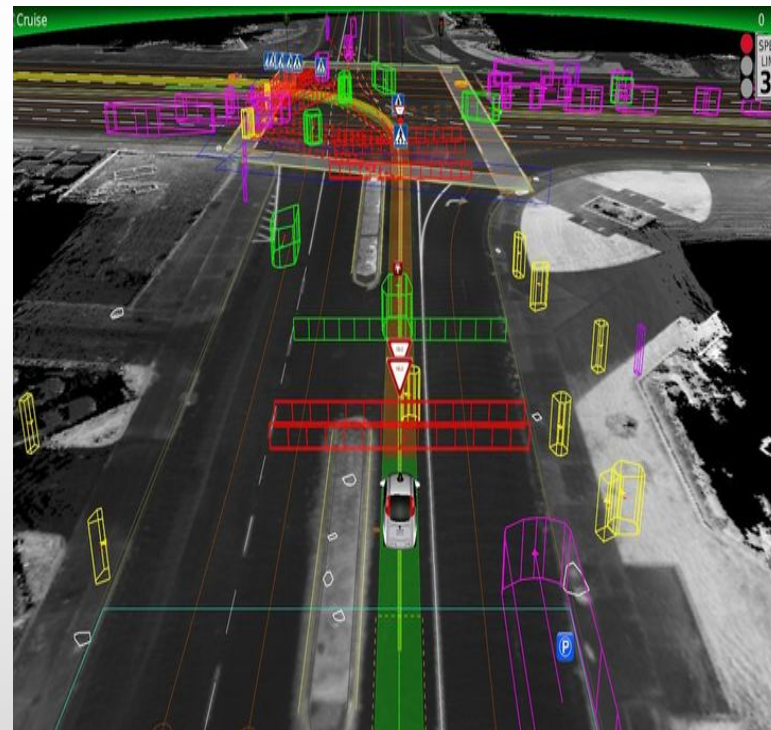
-  Motivation.....
-  Methodology.....
-  Results.....
-  Future work.....

1. Motivation

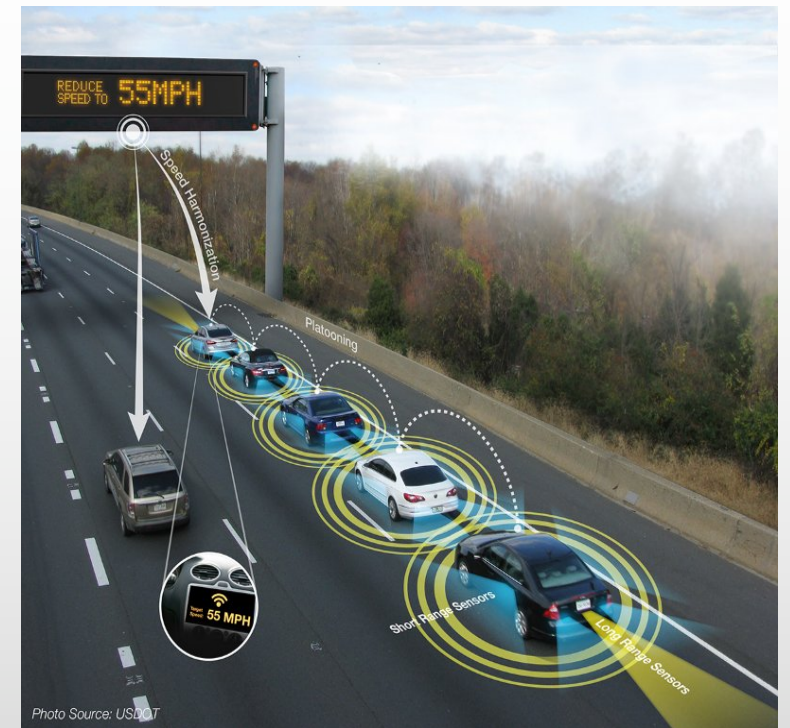
Smart city



Autonomous driving



Intelligent transportation systems

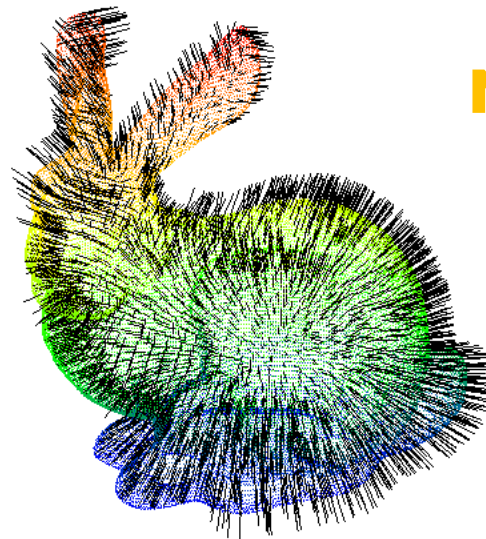


Highly accurate, regular updated urban map
is increasingly demanded

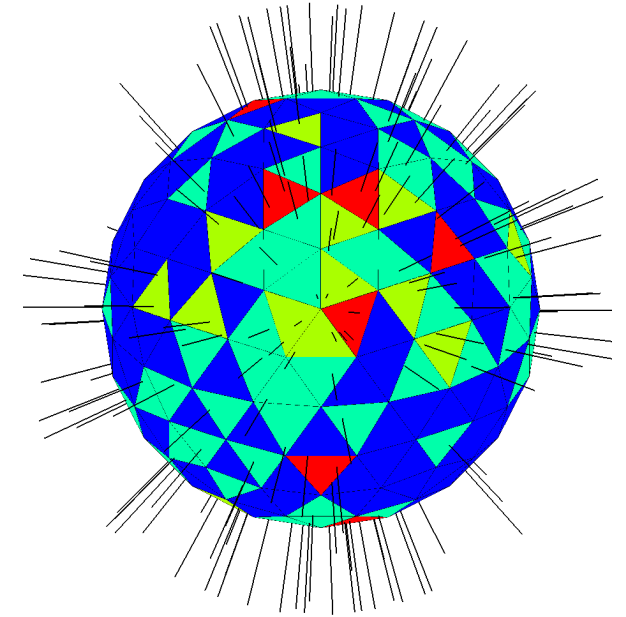
2. Methodology



Normals



Map normals
on sphere



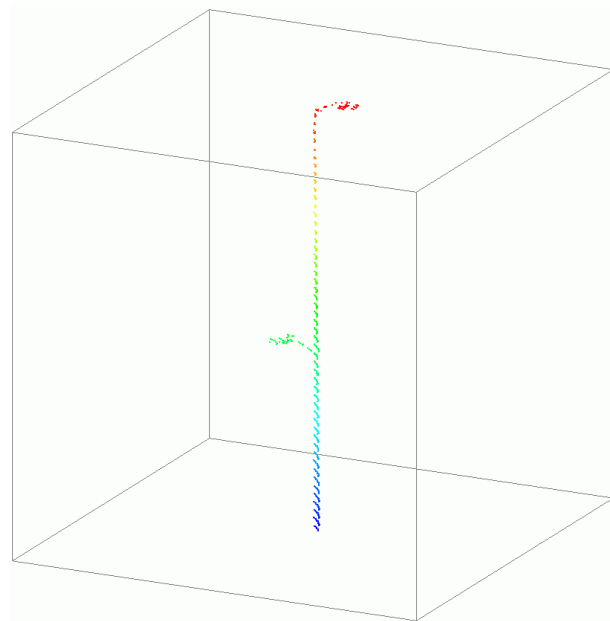
Advantages:

- Rotation invariant
- Sensitive to small shape variations
- Easy to compute

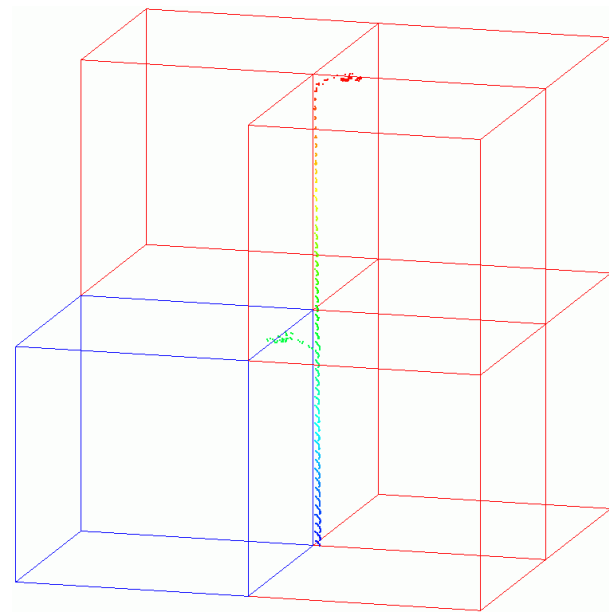
Disadvantages:

- Fixed resolution
- Not robust
- Difficult to match

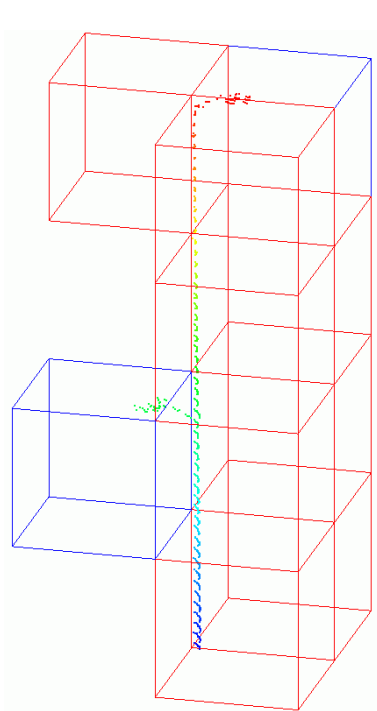
SigVox 3D descriptor of a lamp pole



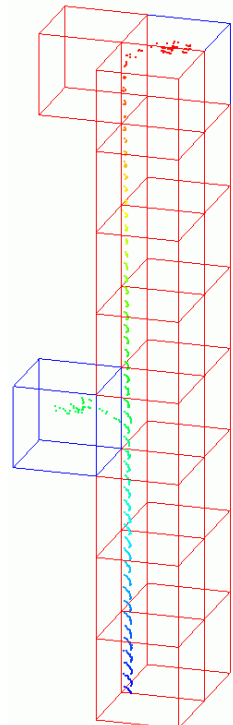
bounding box



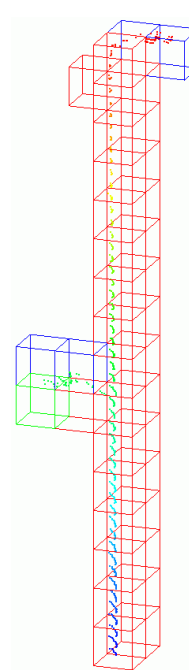
LOD 1



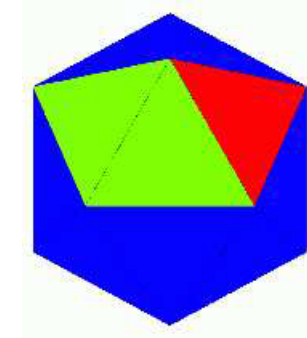
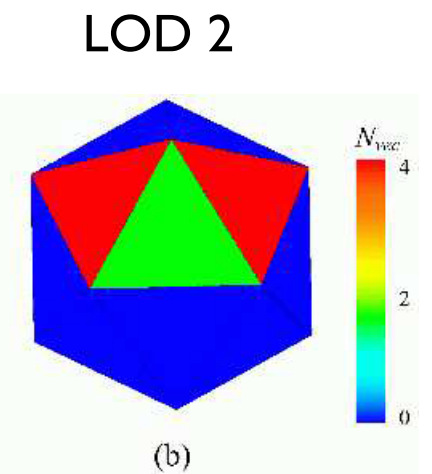
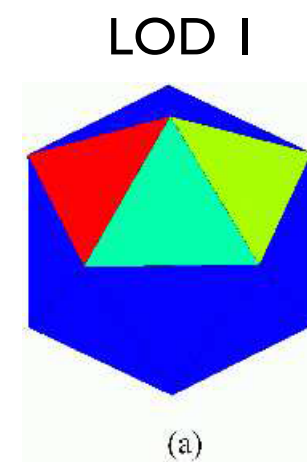
LOD 2



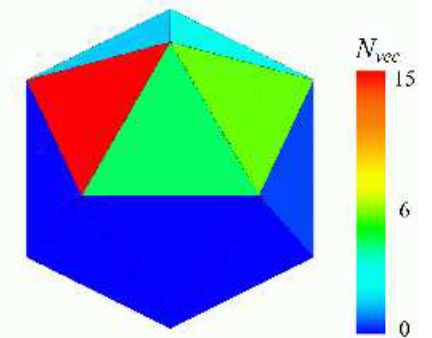
LOD 3



LOD 4






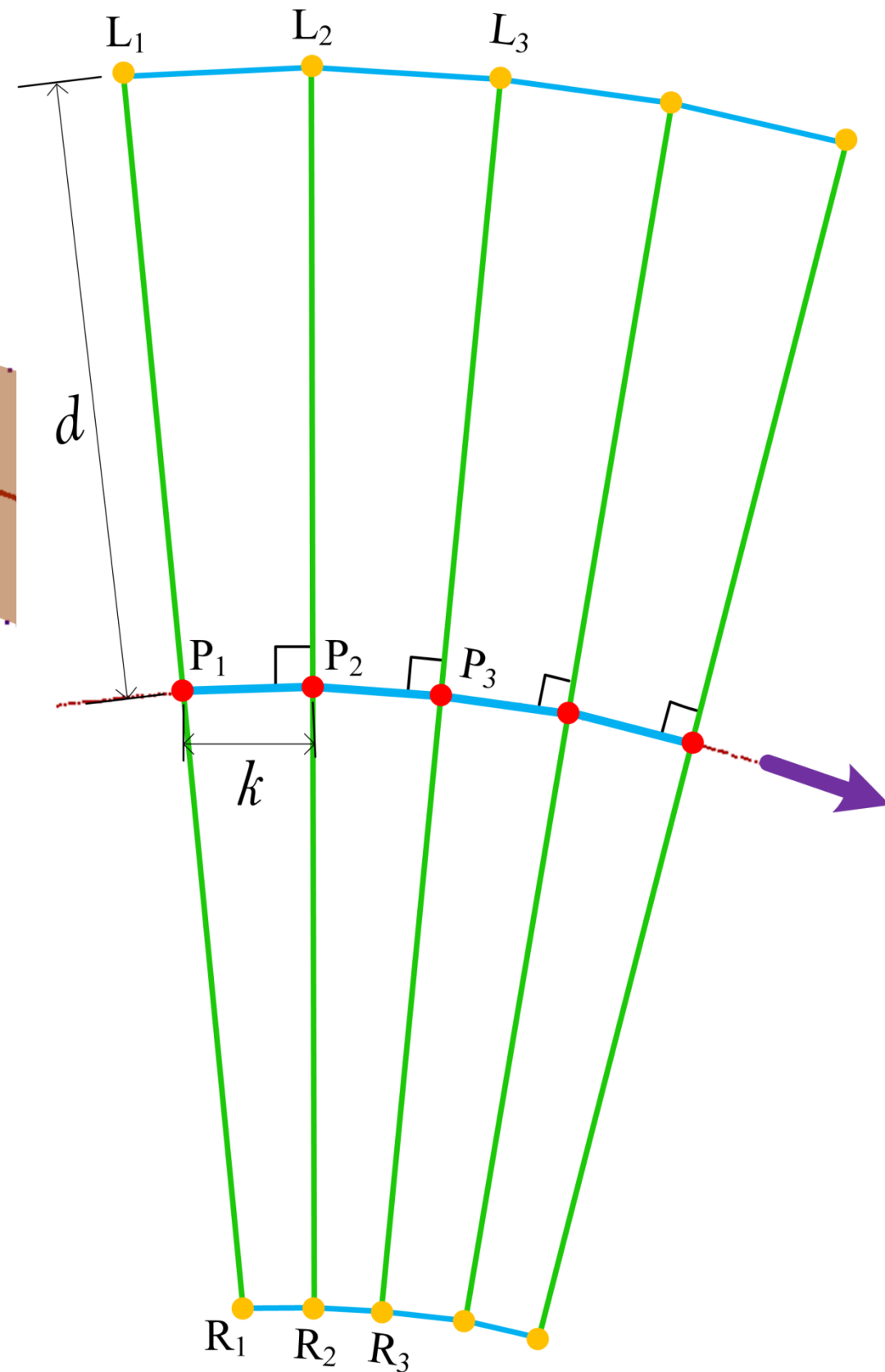
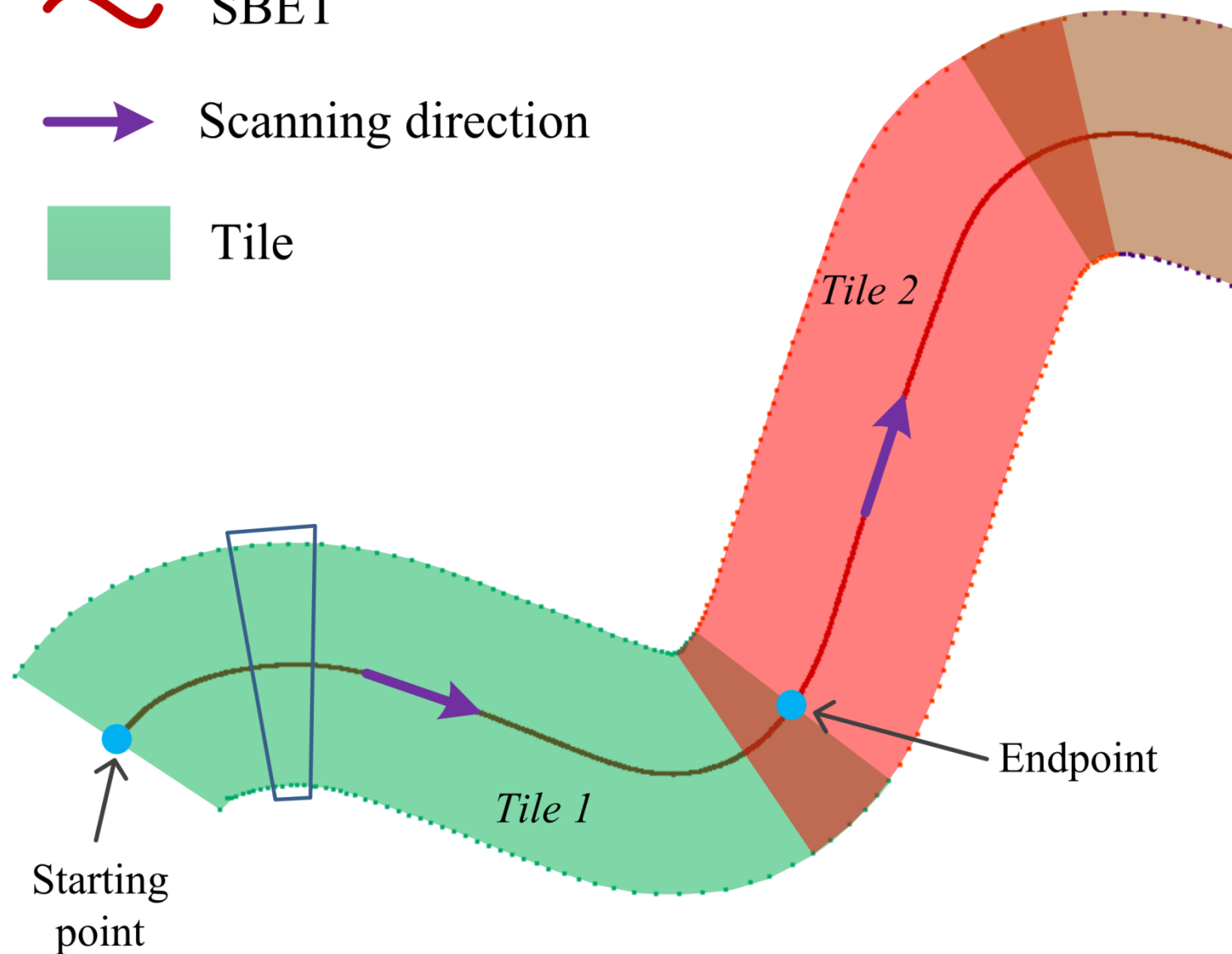
LOD 3



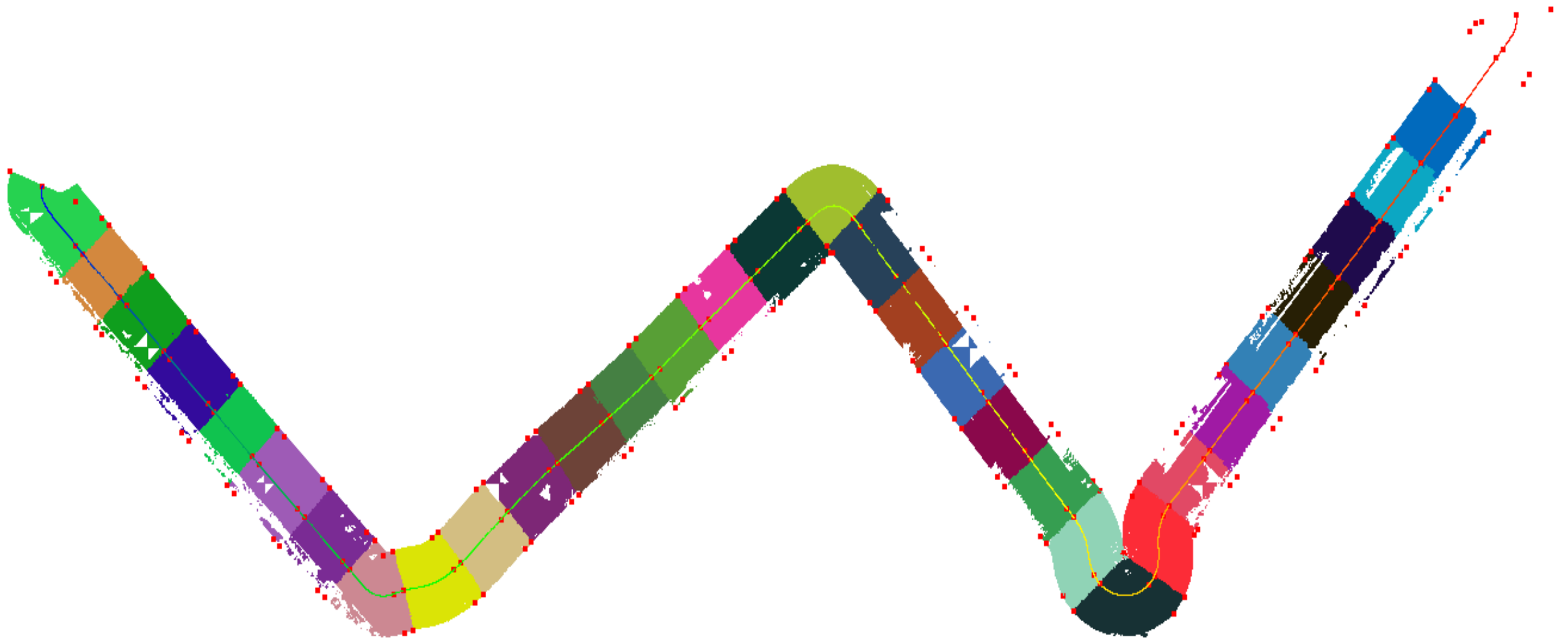
LOD 4

Retiling

-  SBET
-  Scanning direction
-  Tile

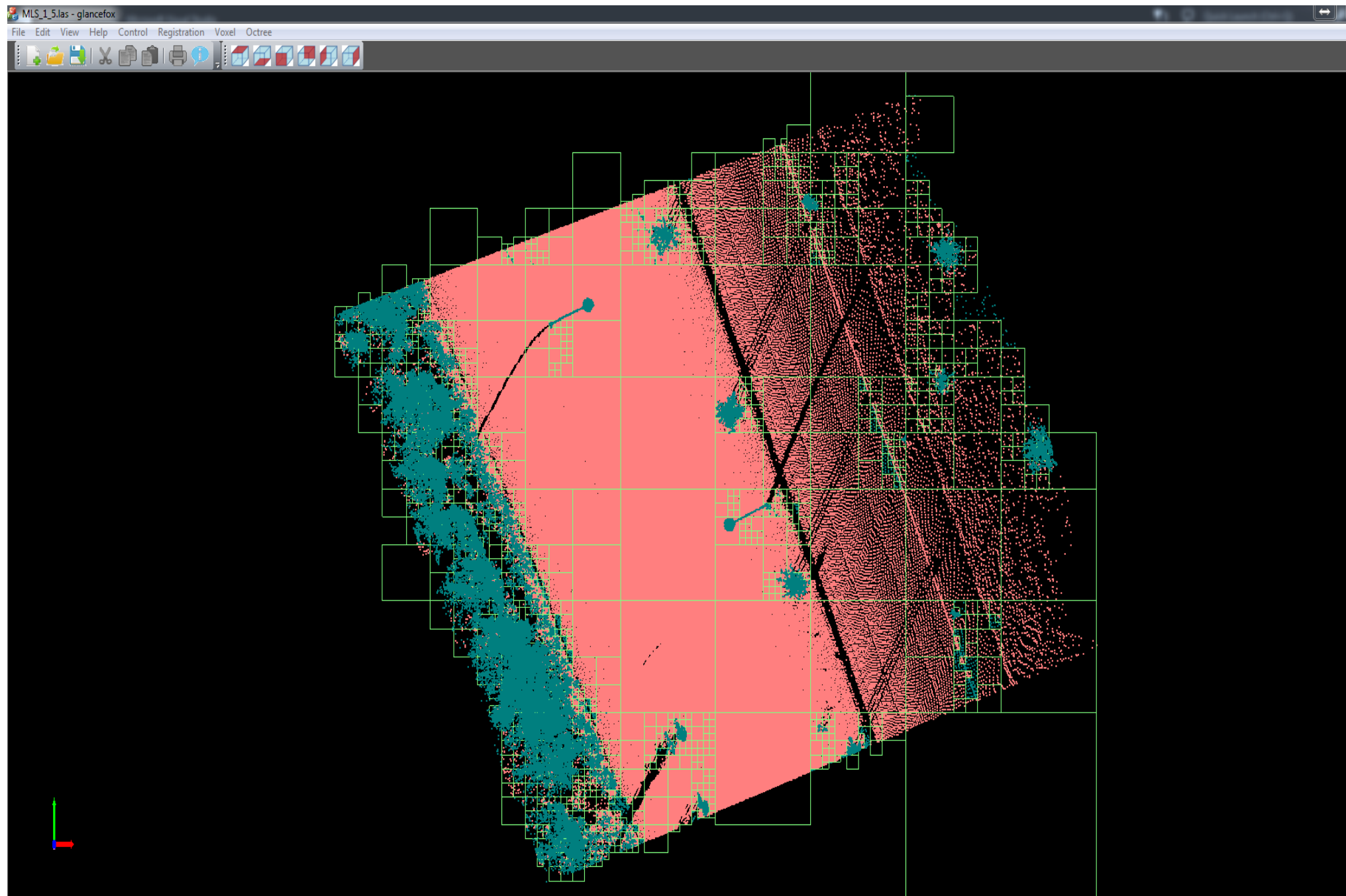


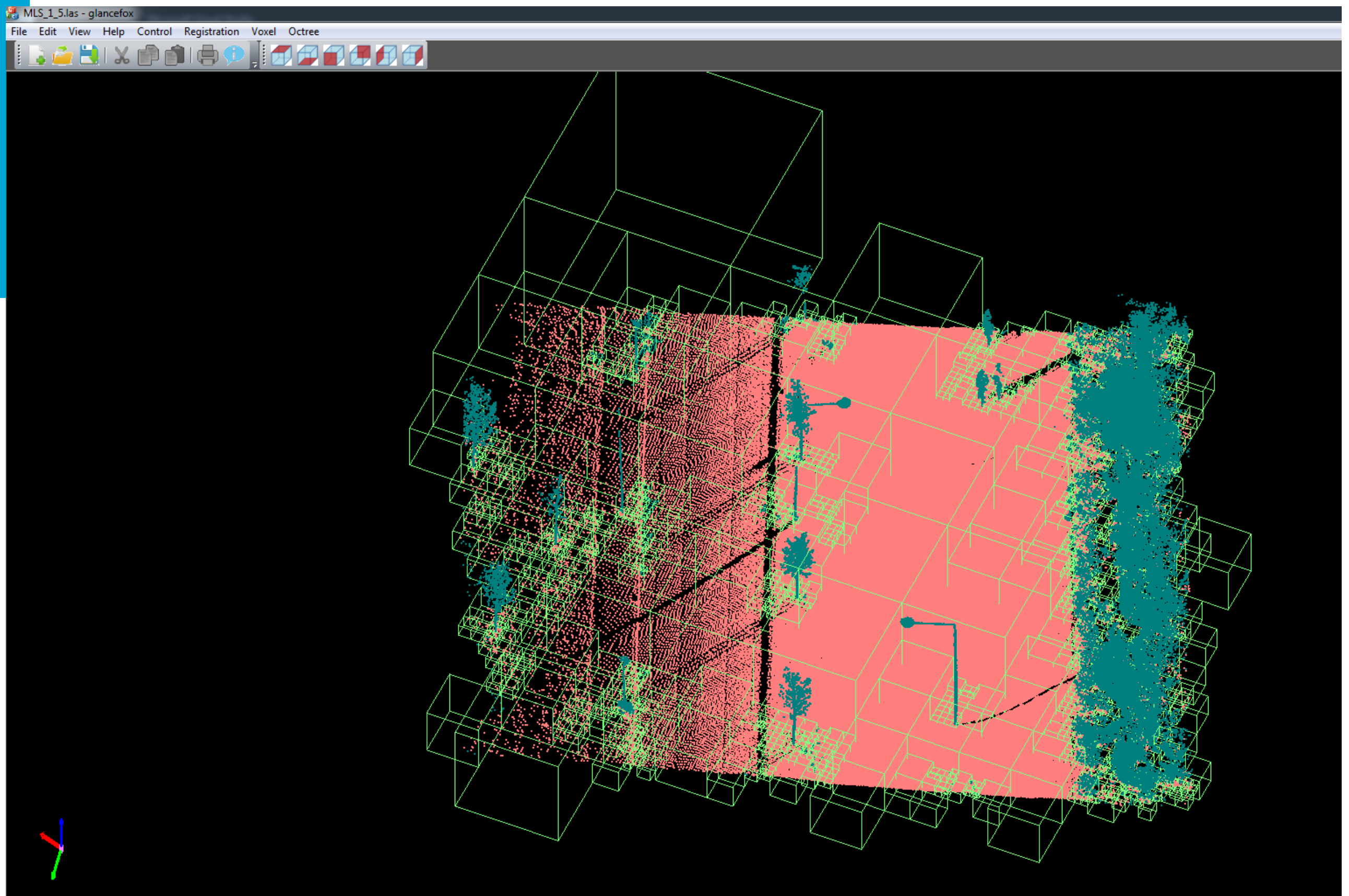
Retiling



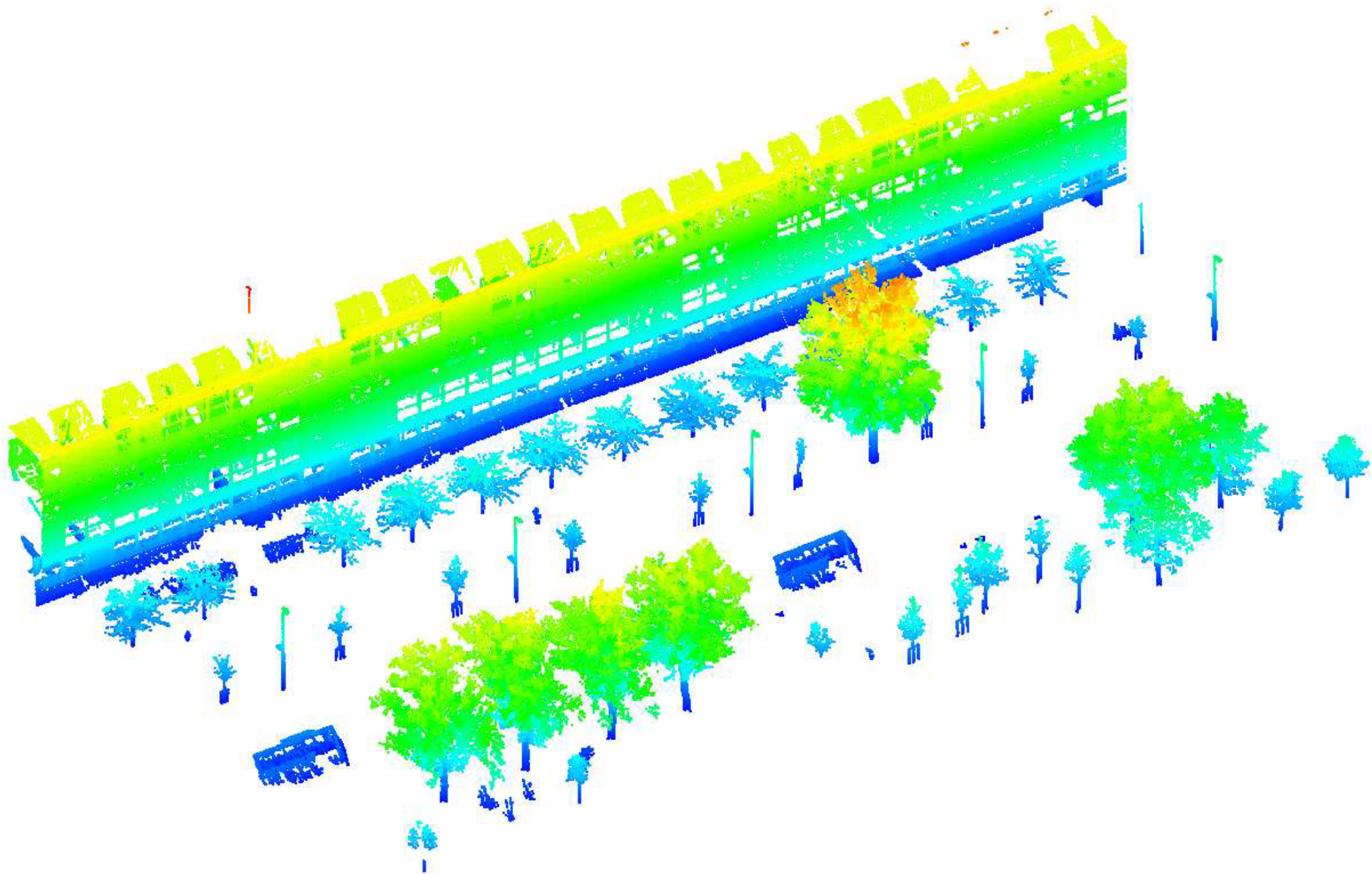
Filtering

---separate ground and non-ground points

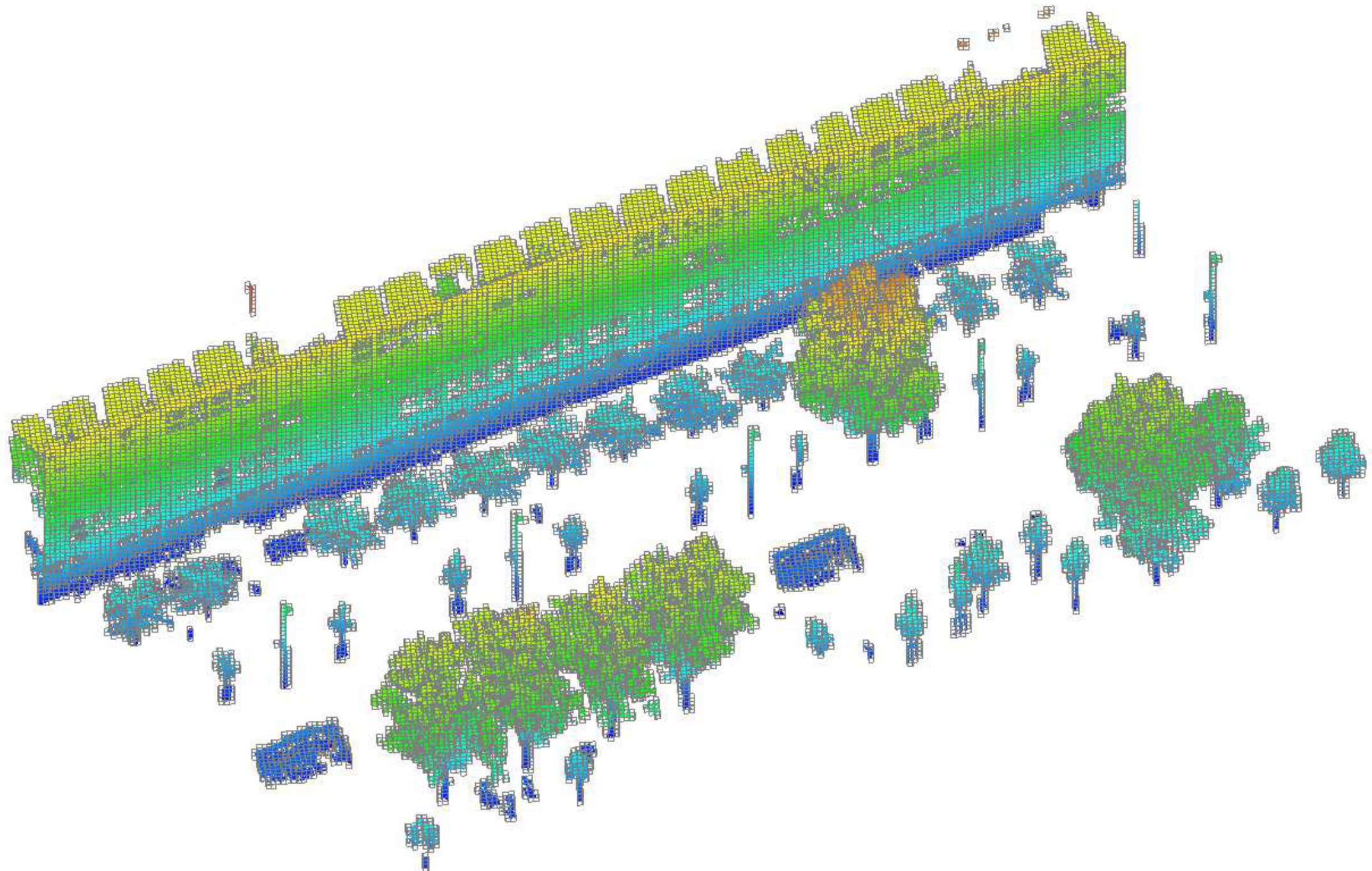




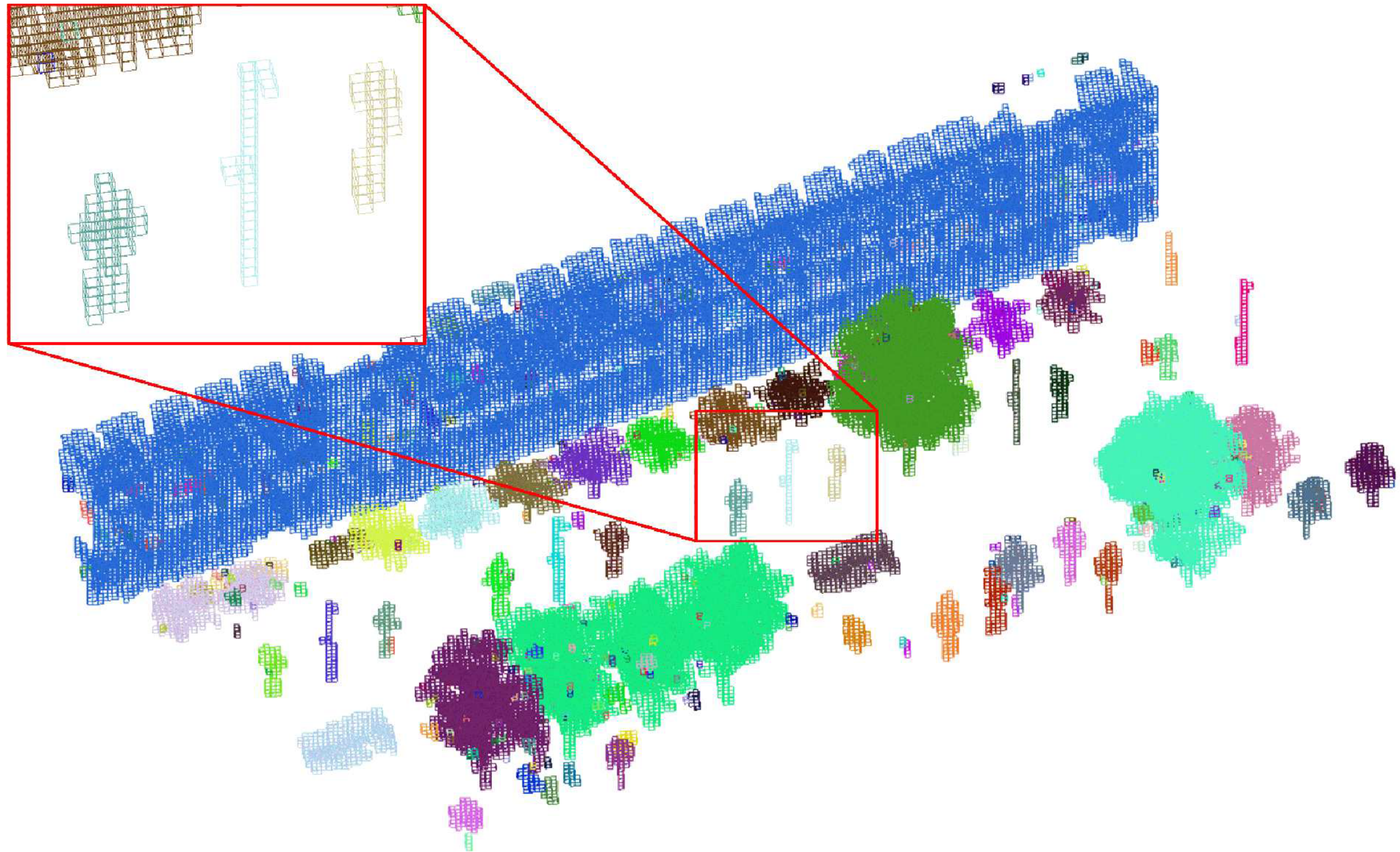
Voxelization & Clustering



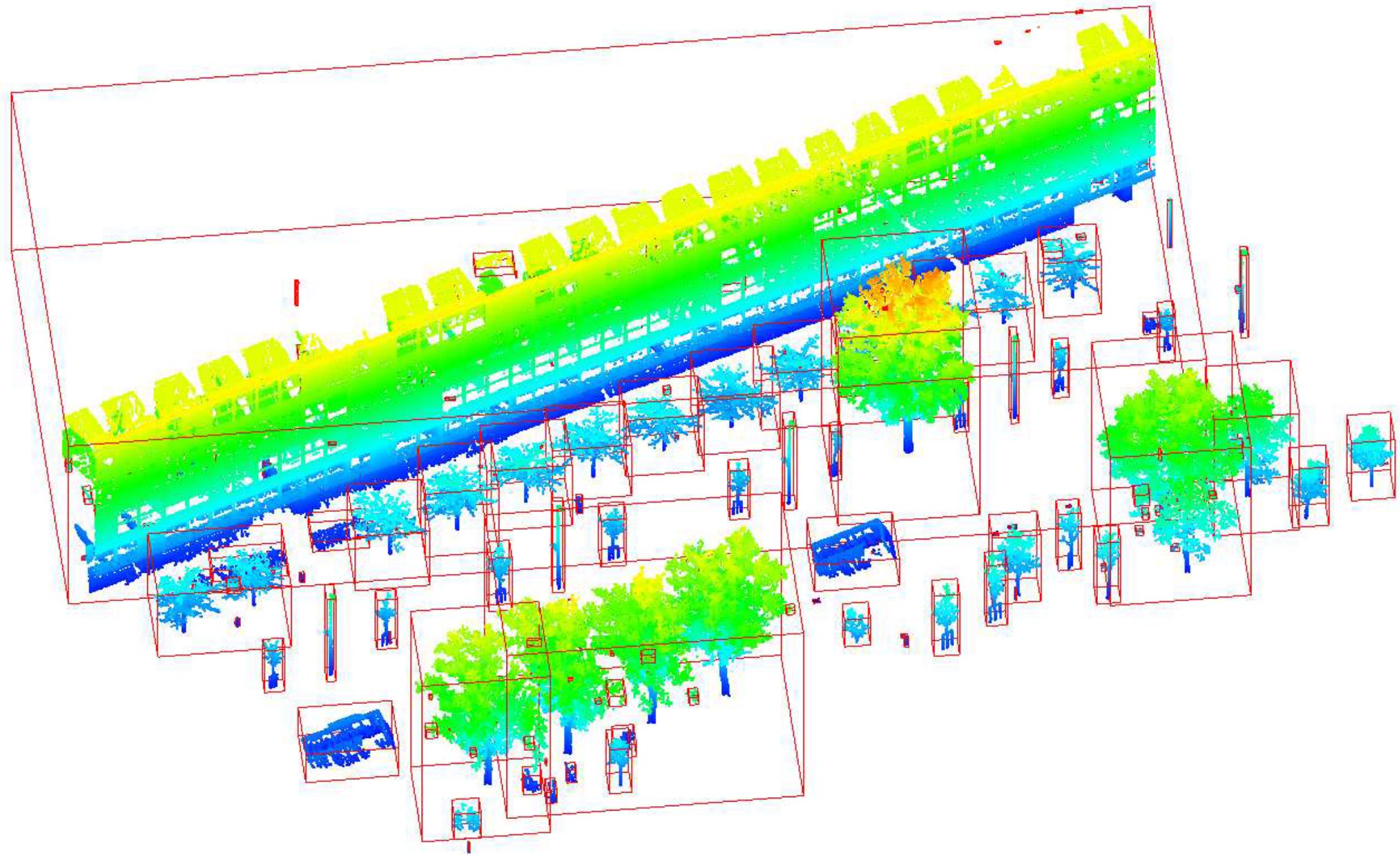
Non-ground points in voxels



Voxel clusters



Bounding boxes of clusters

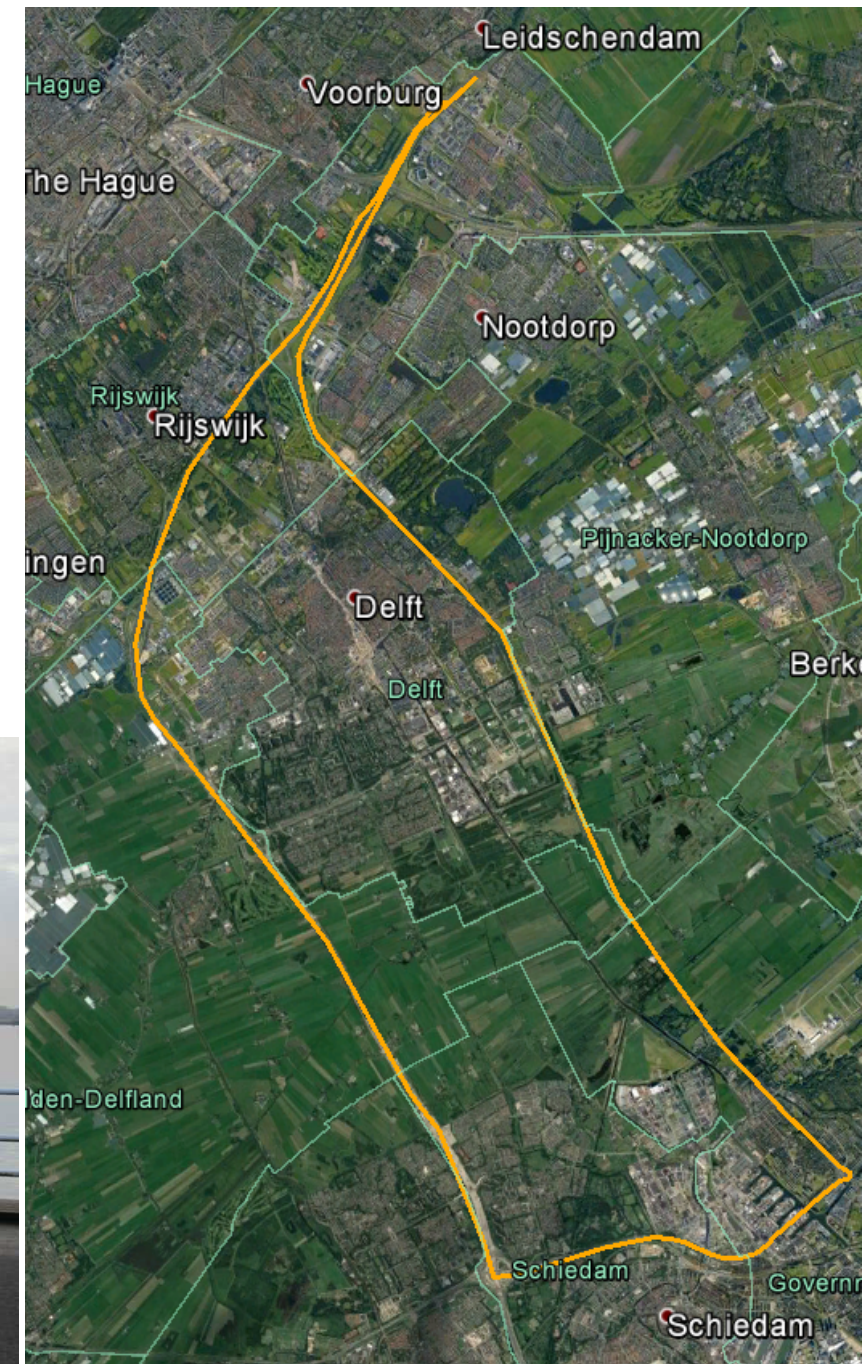


3. Results

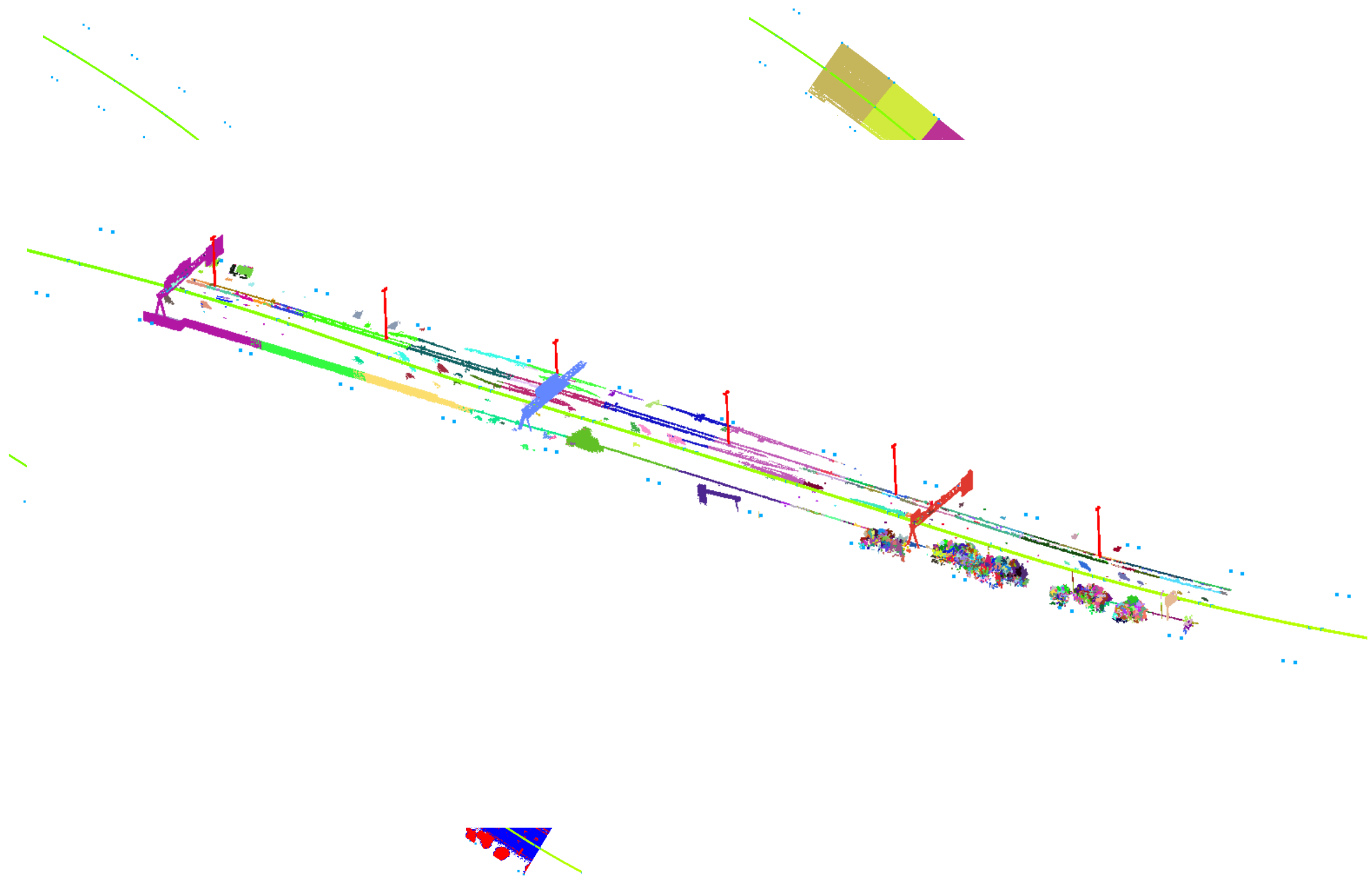
Data description

48 km of Fugro DriveMap data:

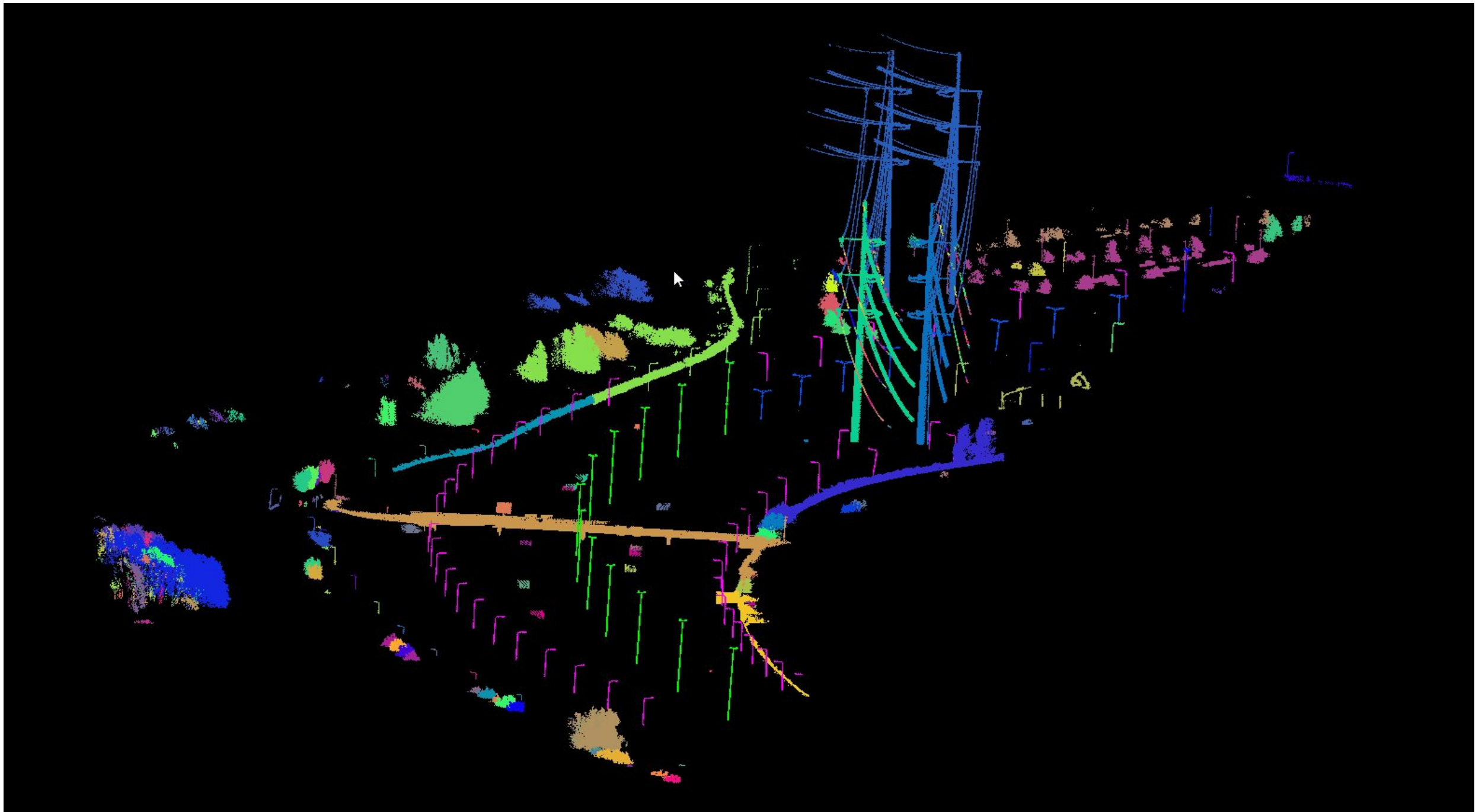
- Highway A4-A20-A13
- Two runs in opposite direction
- Scanned three cycles
- ~3.5 TB data



Processing workflow

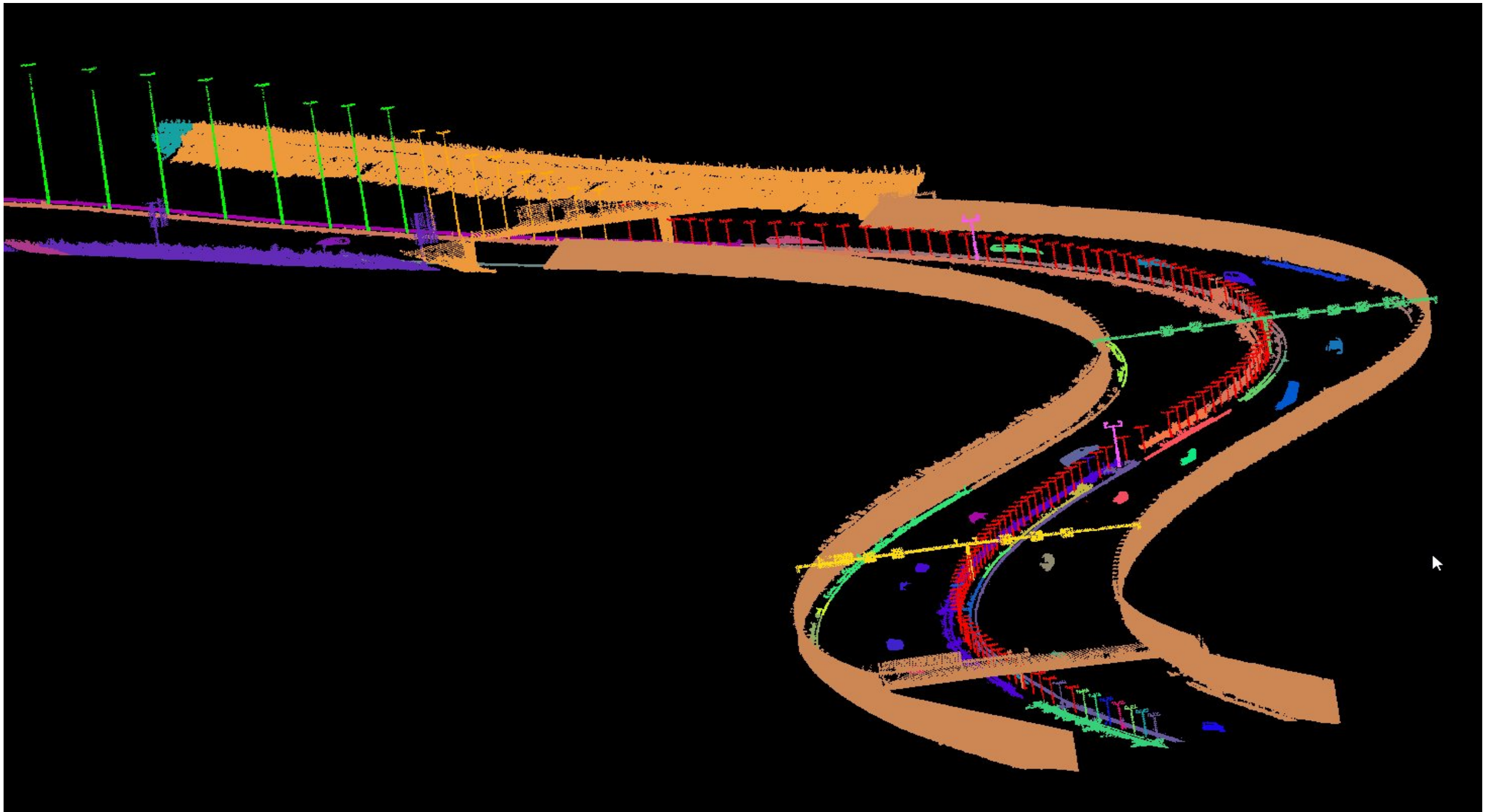


Results – A4



95% of lamp poles were correctly identified.

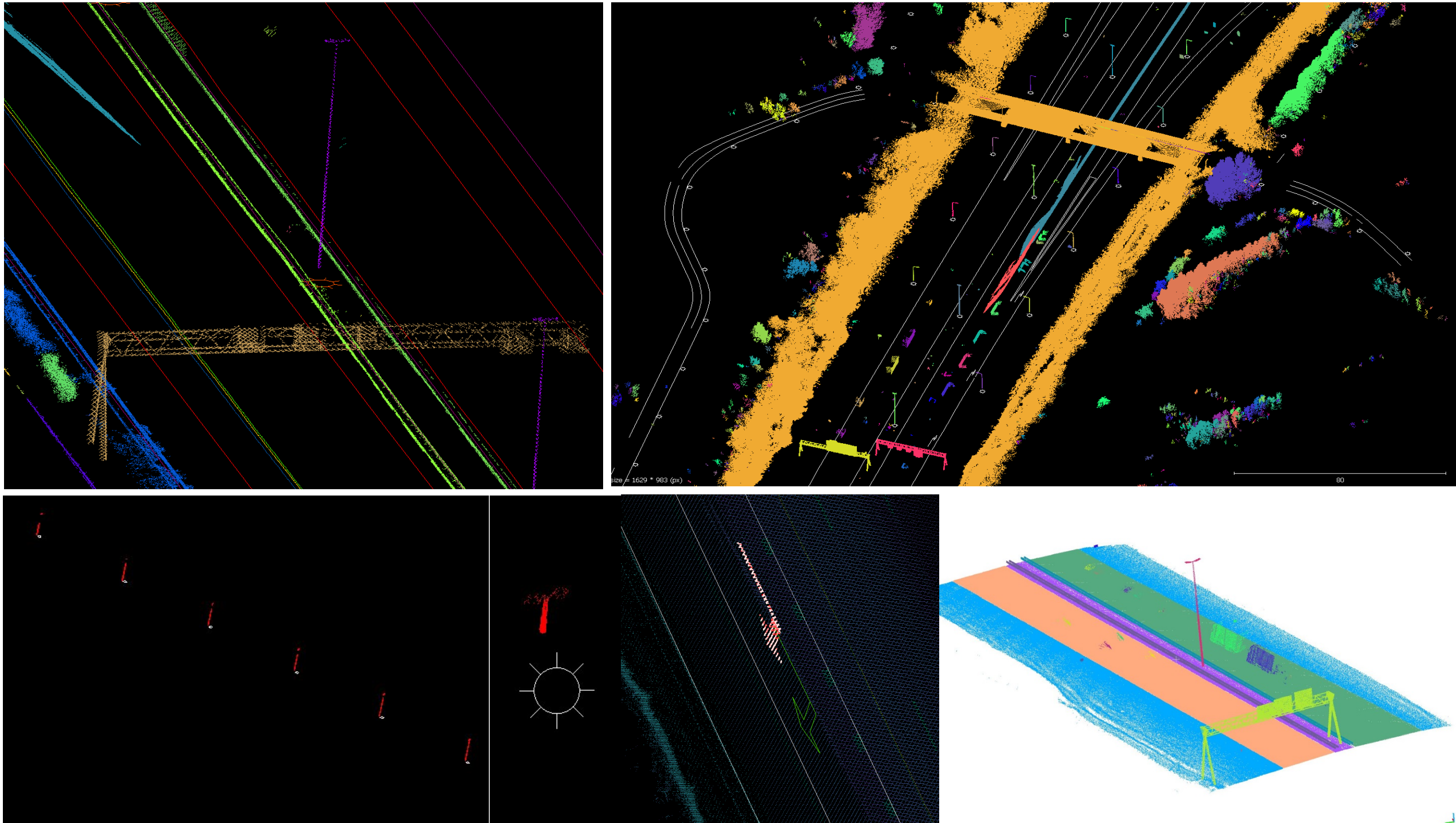
Results – A13



97% of lamp poles were correctly identified.

4. Future work

Generate HD map & Update existing map



Questions?

