

# yuan\_proj

This repository contains the code and results of the assignment detail please see readme.md

## Requirements

### Environment

1. Python 3.8.\*
2. pandas
3. geopandas
4. fiona
5. overpass
6. shapely
7. scikit-learn
8. alphashape

### Install

Create a virtual environment and activate it.

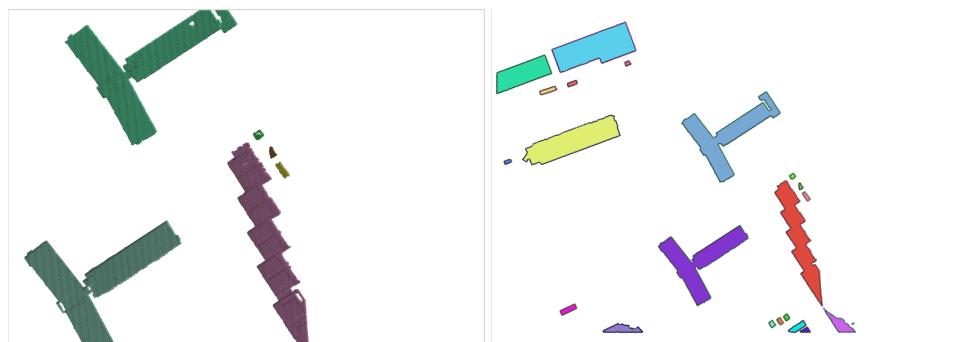
```
conda create -n 3Dseg python=3.8
conda activate 3Dseg
conda install geopandas
conda install scikit-learn
pip install alphashape
```

### Dataset

To evaluate the proposed code, you will need to prepared required datasets as the folder structure shows bellow. The provided raw .laz file will format into .las in the folder ./data, and the results will store in./results. According to our test, we select an area of interest in size of 1000\*1000 meter in EPSG:7415 to test the codes.

```
|-- yuan_proj
    |-- data
    |-- results
```

### Extraction results





(a)Segment Point

(b)Extracted polygon

Results are shown in six different ways, segment interest object (building) point clouds/polygons with Google satellite image background, with raw points classify index and without any background. All the results are visualized in QGIS.

## Interest Objects Search strategies

First, visualize the given points cloud in QGIS. According to the visualization results, the .las file has already been classified. Then choose to clustering the Building object.





## Detailed processing steps

The overall processing steps can be find as below:

### 1. preprocesssing the data for ML based clustering

```
building_pts  
building_pts_gdf
```

### 2. using OPTIC method clustering the extracted building points for individual building segmentation

```
clustering = OPTICS(min_samples=80).fit(building_pts_crop)
```

### 3. Using the segmented results for individual object boundary extraction

```
building_poly=alphashape.alphashape(building_to_poly.geometry, alpha=1)
```

## Acknowledgment

If you have any questions please find contacts Dr. Yuan at: [milowei304@gmail.com](mailto:milowei304@gmail.com)