

Extract Ceiling

ISL
안재원

- Ceiling
- Extract Ceiling based on Geometry
- Extract Ceiling based on Segmentation
- Result

01

Ceiling

Intro

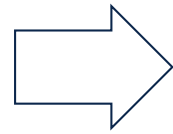


Extract Ceiling based on Geometry

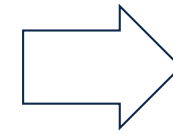
02

Intro

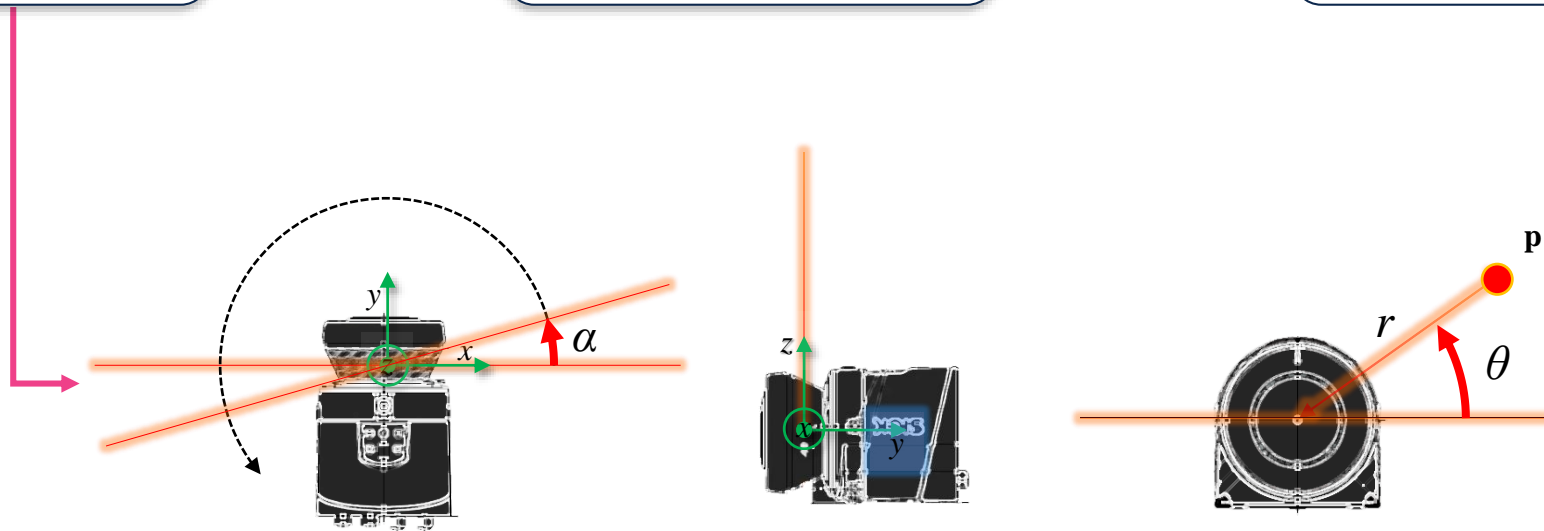
각 Point Cloud의
(x,y,z) 정보 획득



높이 정보를 이용해
천장 후보 선정



천장 후보 정보를
이용해 천장 검출



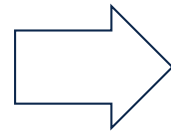
$$P_{\text{spherical coordinate system}}(r, \theta, \phi) \Rightarrow P_{\text{rectangular coordinate system}}(r \sin \theta \cos \phi, r \sin \theta \sin \phi, r \cos \theta)$$

Extract Ceiling based on Geometry

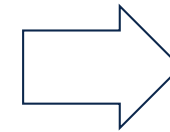
02

Intro

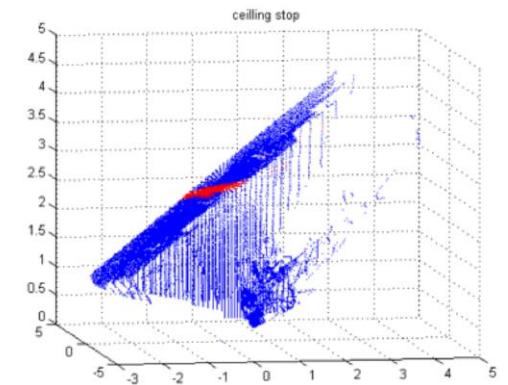
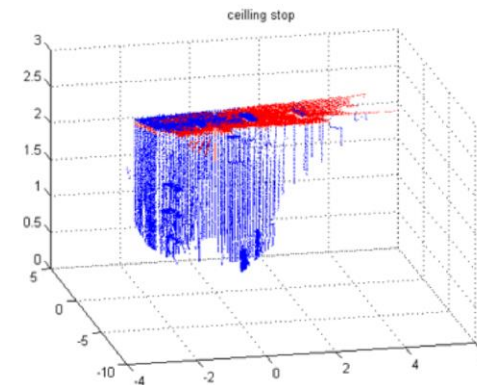
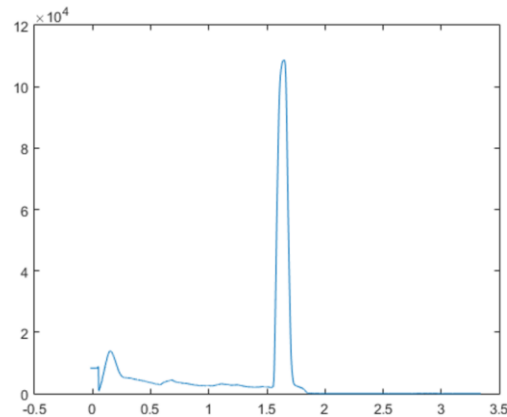
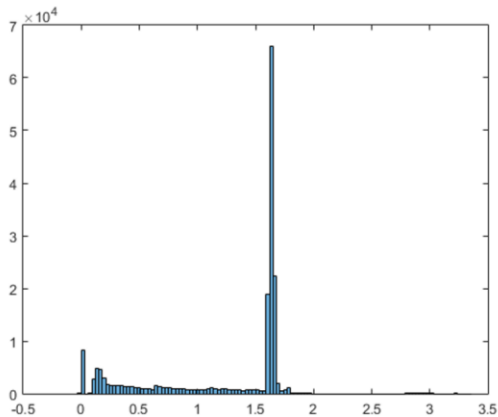
각 Point Cloud의
(x,y,z) 정보 획득



높이 정보를 이용해
천장 후보 선정



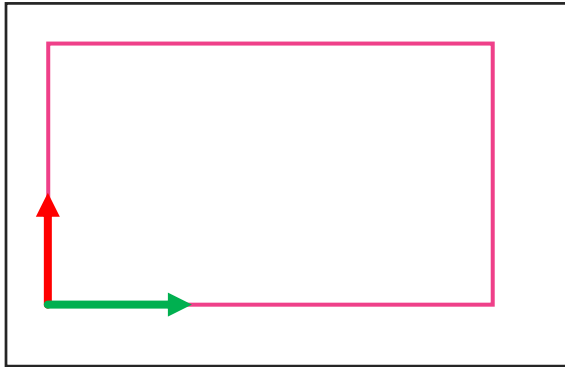
천장 후보 정보를
이용해 천장 검출



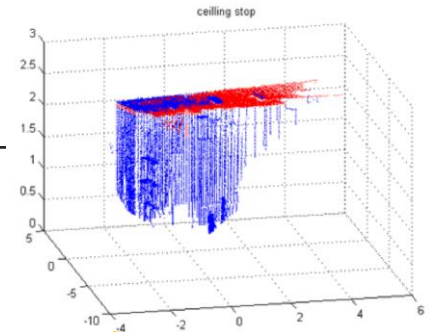
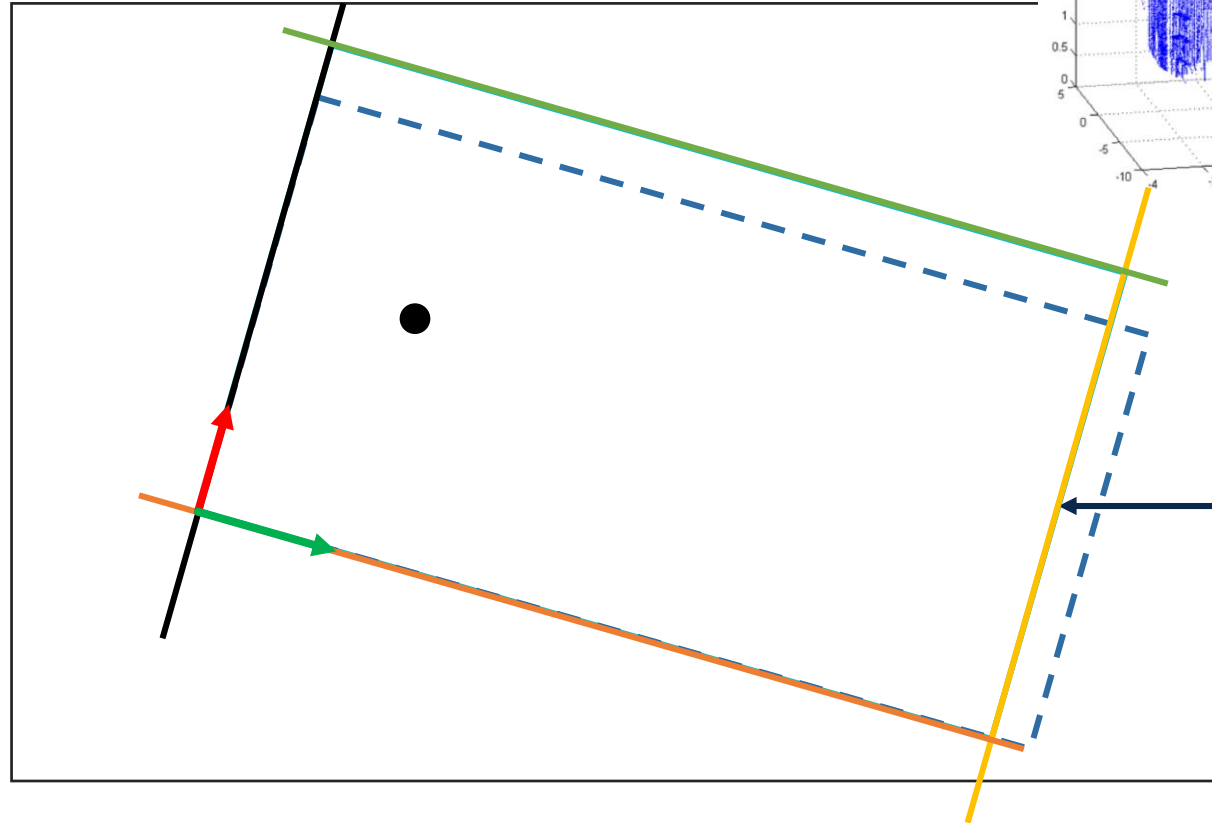
Extract Ceiling based on Geometry

Intro

기준이 되는 천장



추정된 천장

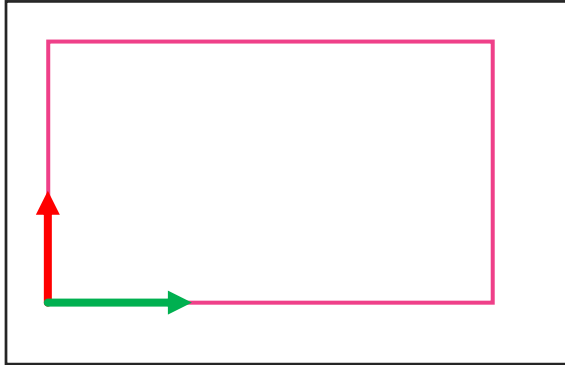


Extract Ceiling based on Geometry

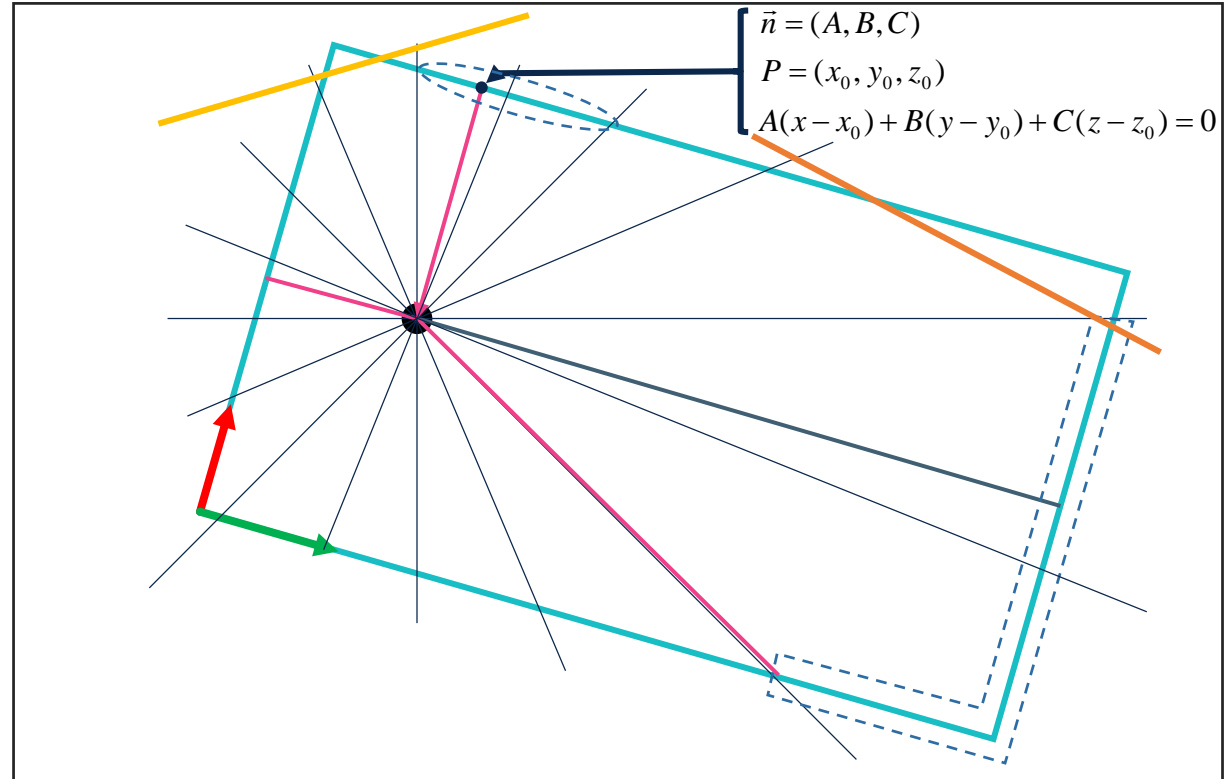
02

Intro

기준이 되는 천장

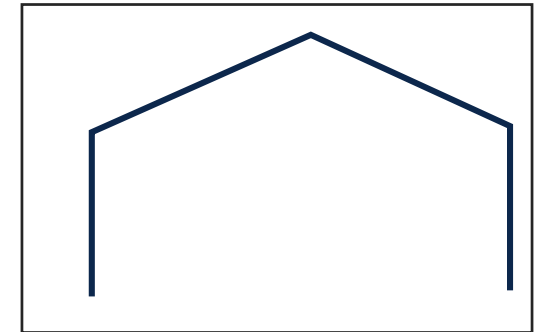
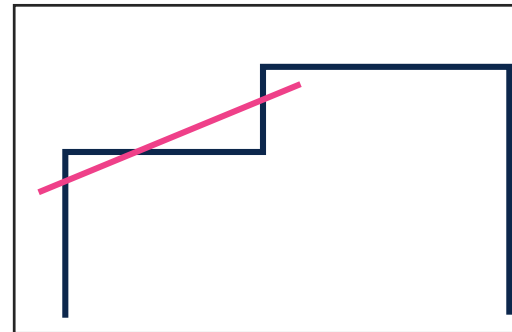
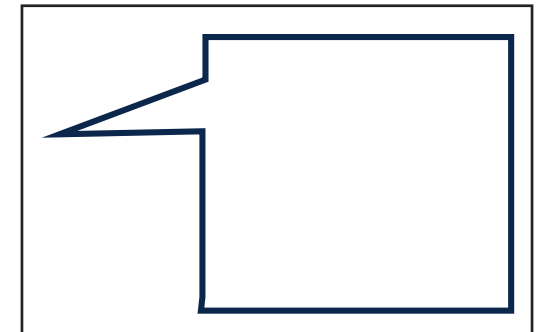
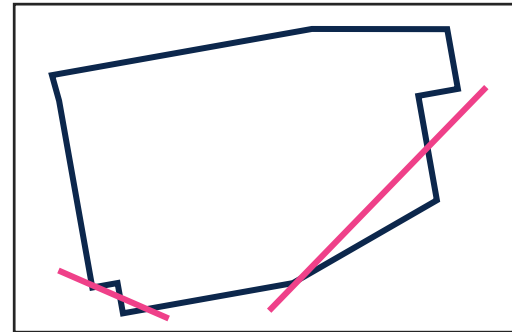
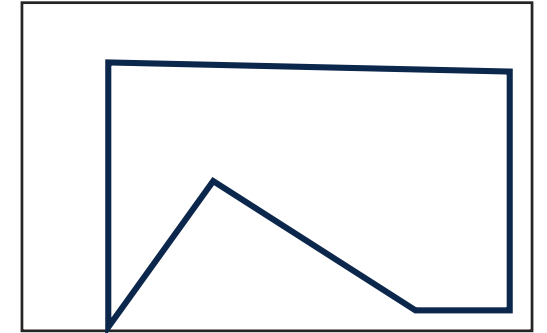
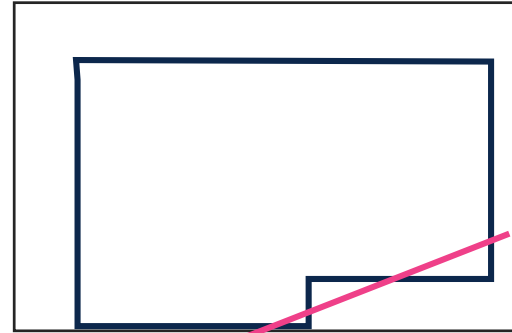
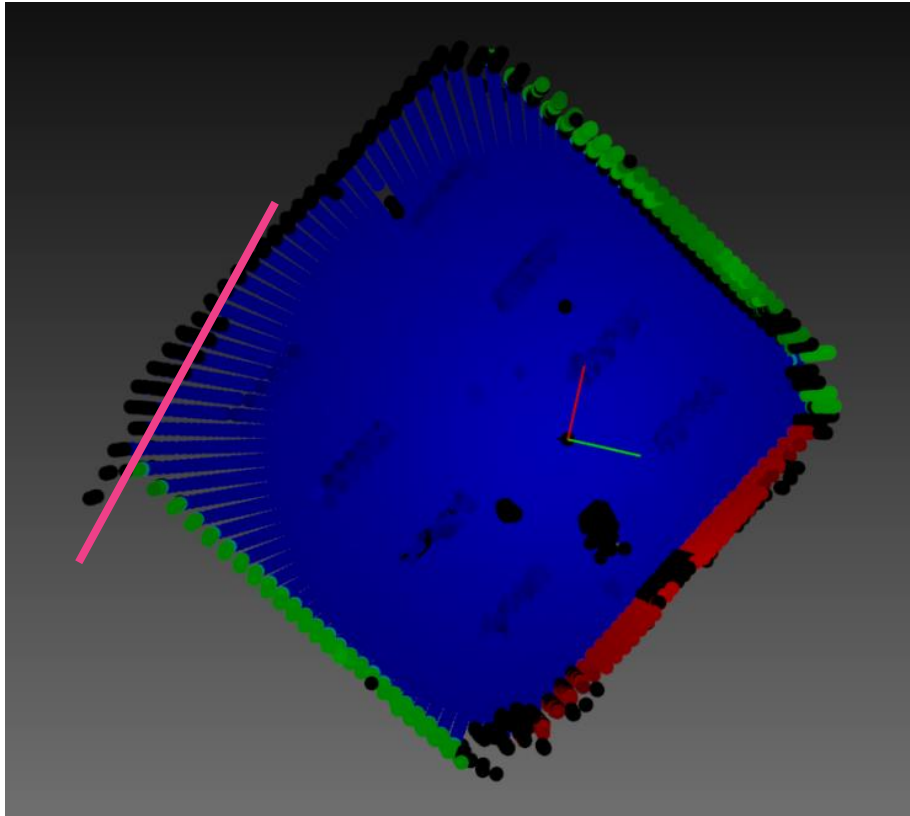


추정된 천장



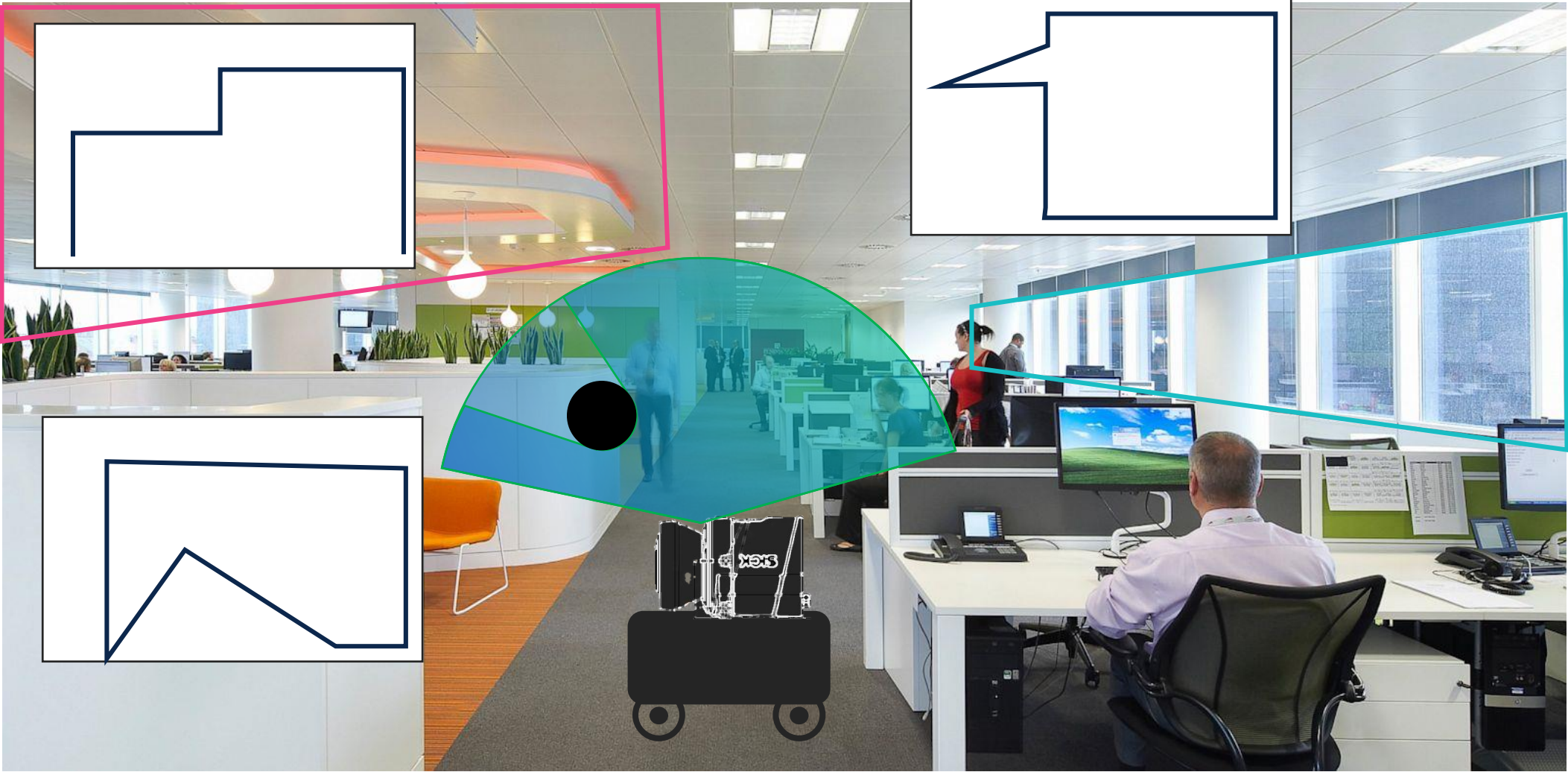
Extract Ceiling based on Geometry

Problem



Extract Ceiling based on Geometry

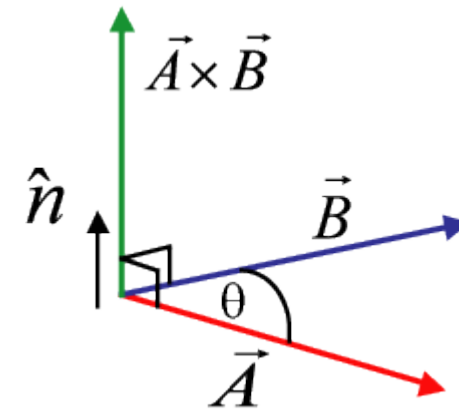
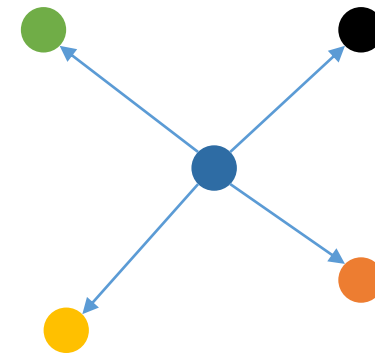
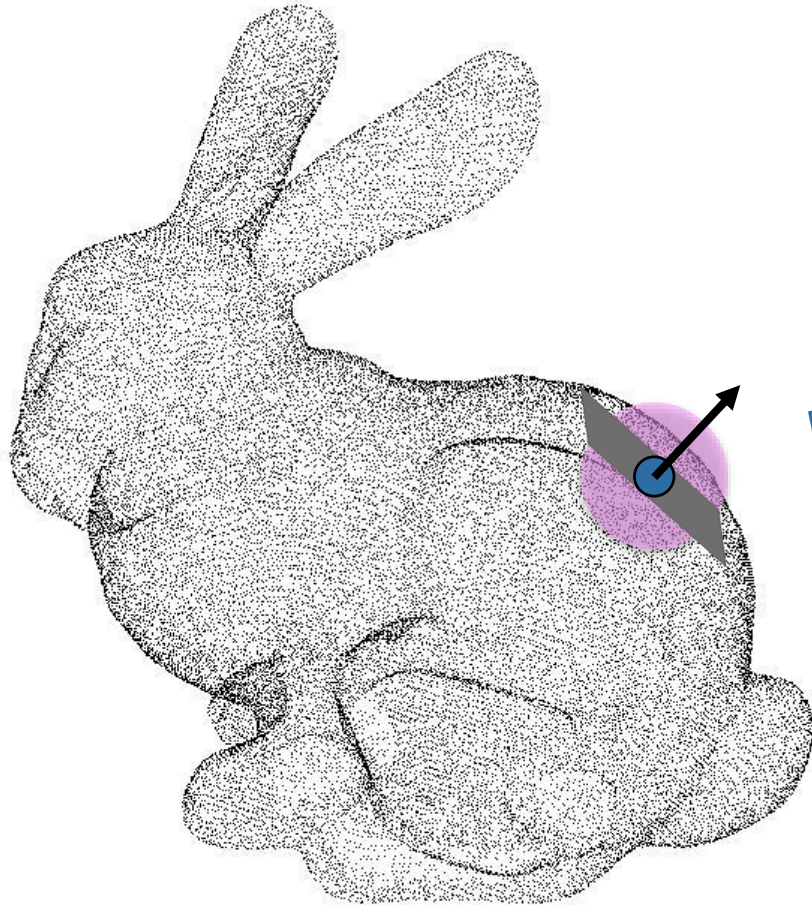
Intro



Extract Ceiling based on Segmentation

Intro

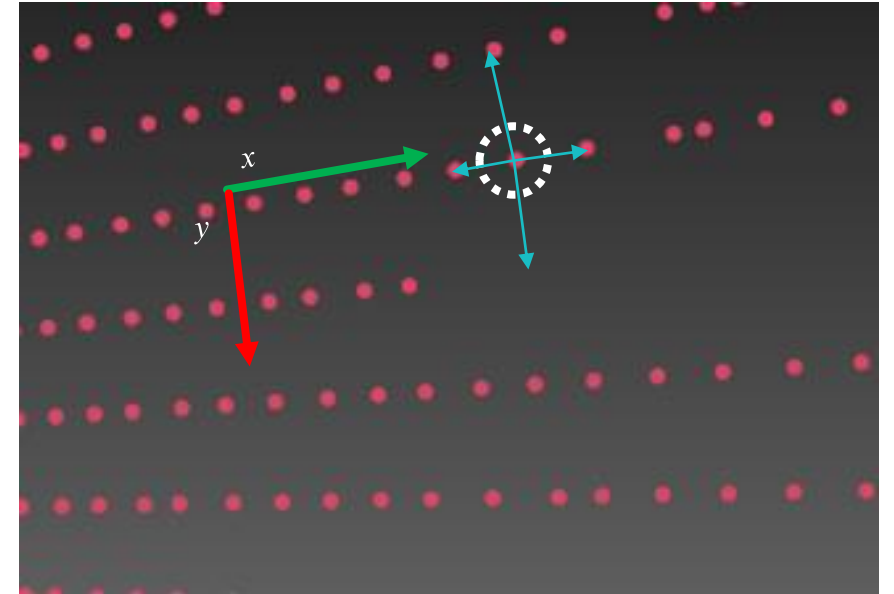
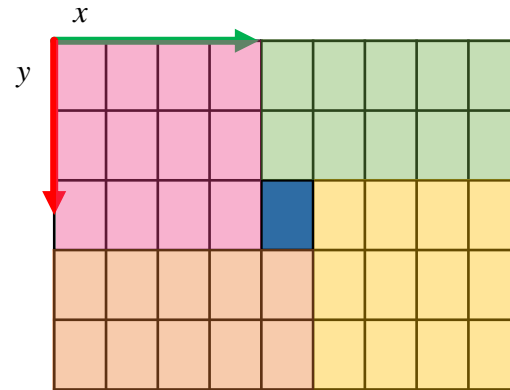
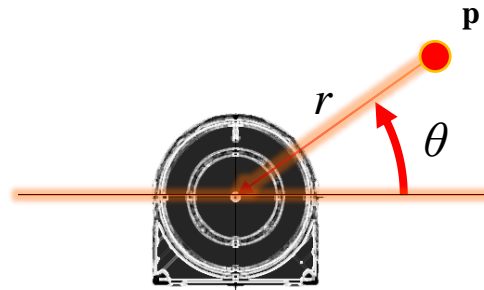
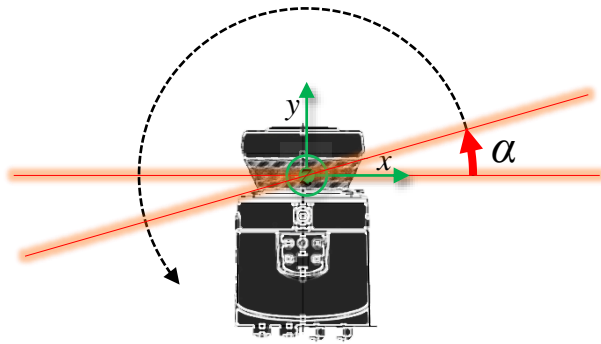
※ Moosmann, Frank, Oliver Pink, and Christoph Stiller. "Segmentation of 3D lidar data in non-flat urban environments using a local convexity criterion." *Intelligent Vehicles Symposium, 2009 IEEE*. IEEE, 2009.



03

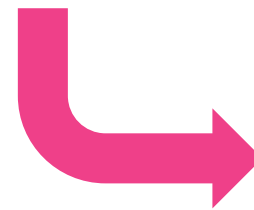
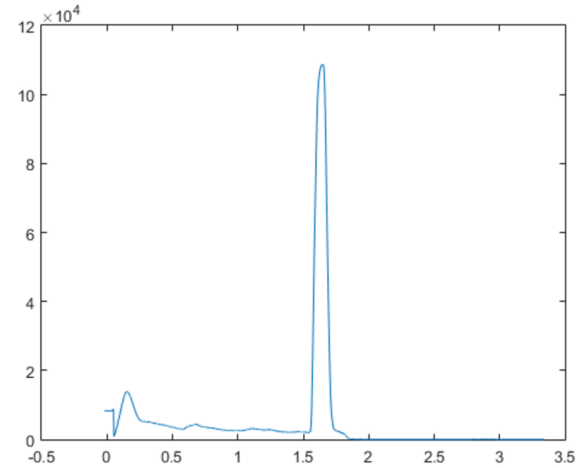
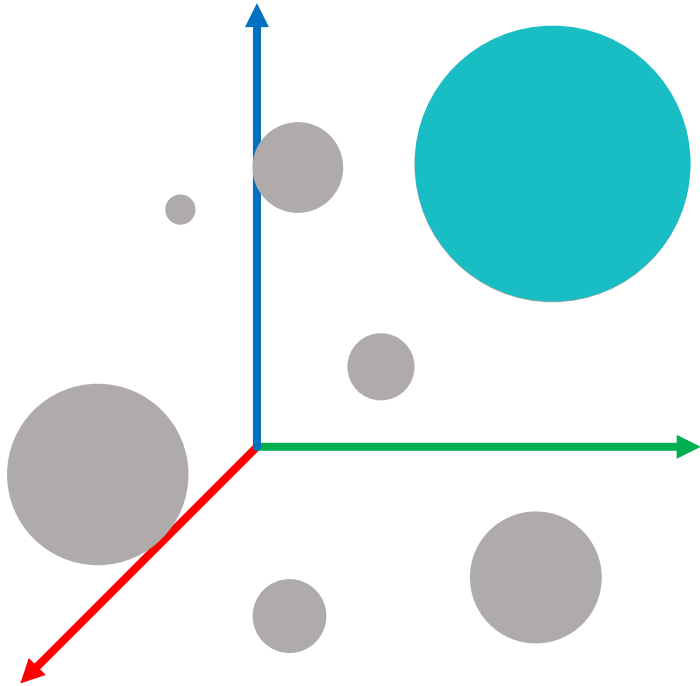
Extract Ceiling based on Segmentation

Get normal



Extract Ceiling based on Segmentation

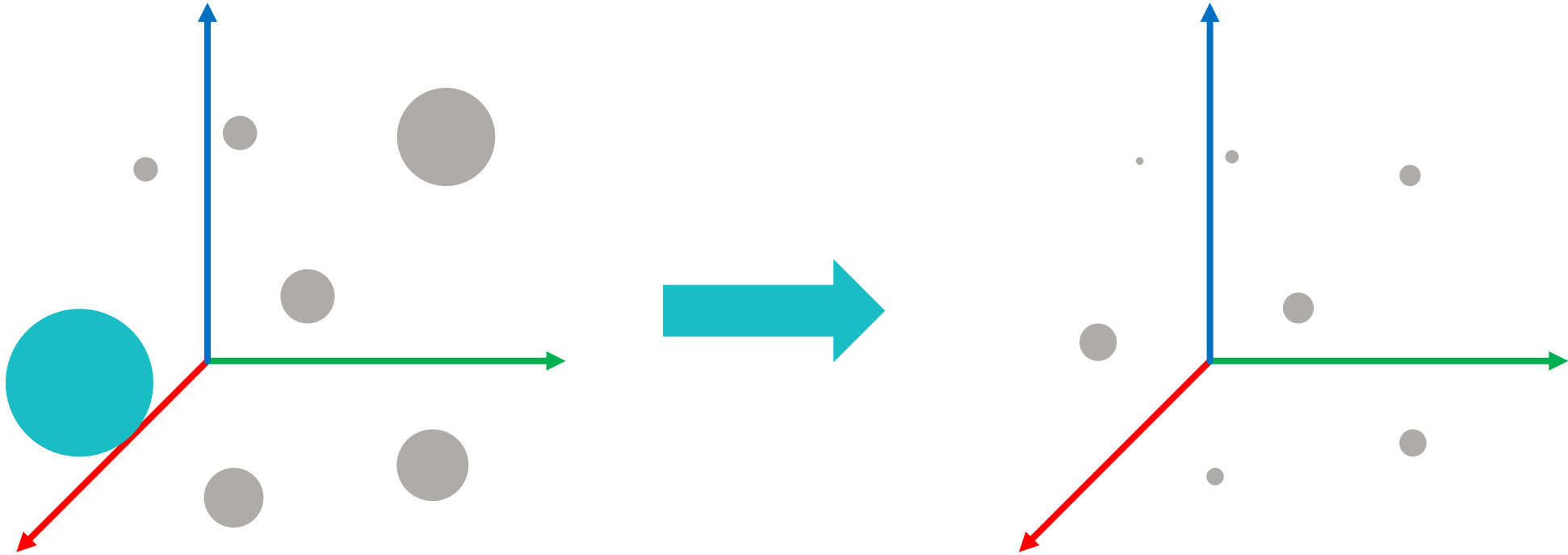
Segmentation



가장 많은 normal 방향 중
가장 많은 거리의 면부터 분할한다.

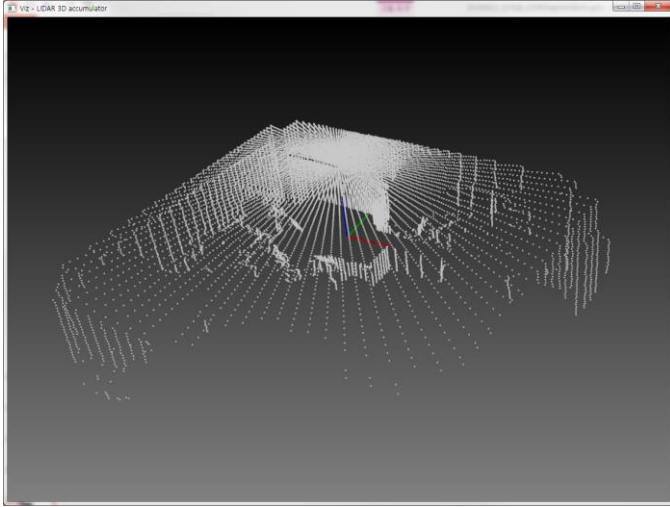
Extract Ceiling based on Segmentation

Segmentation



04

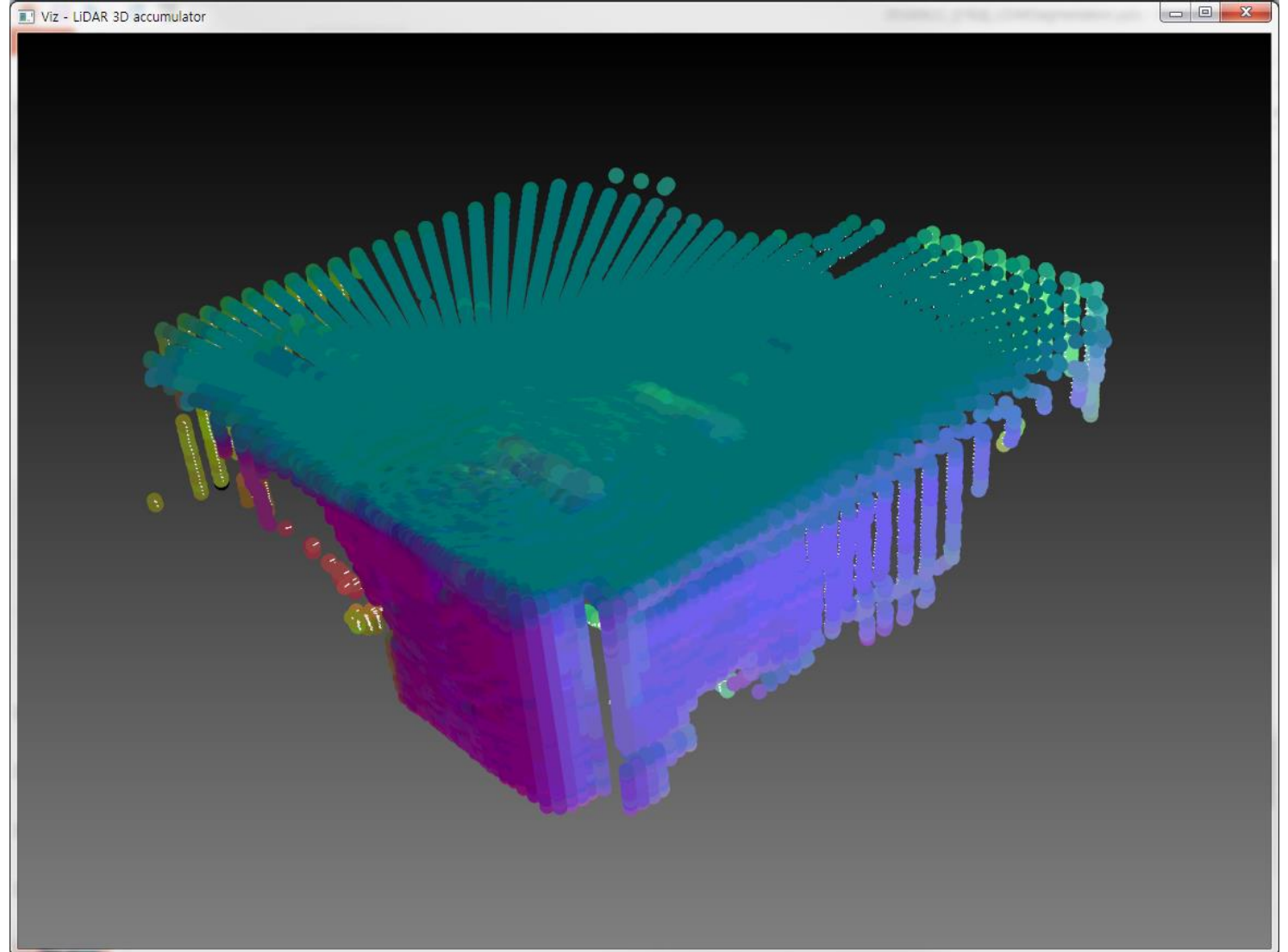
Result



x
y
z
[-1,1]

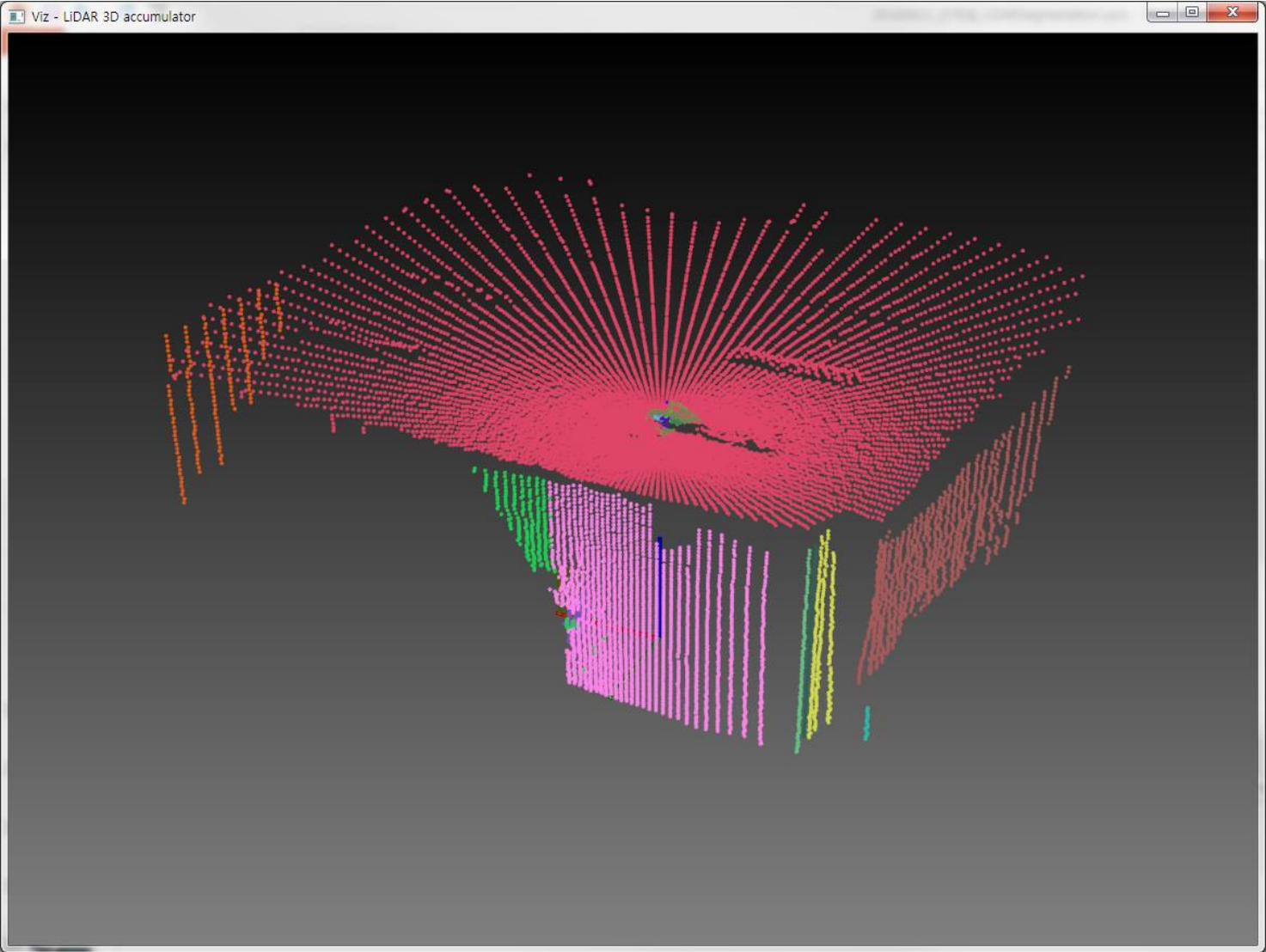
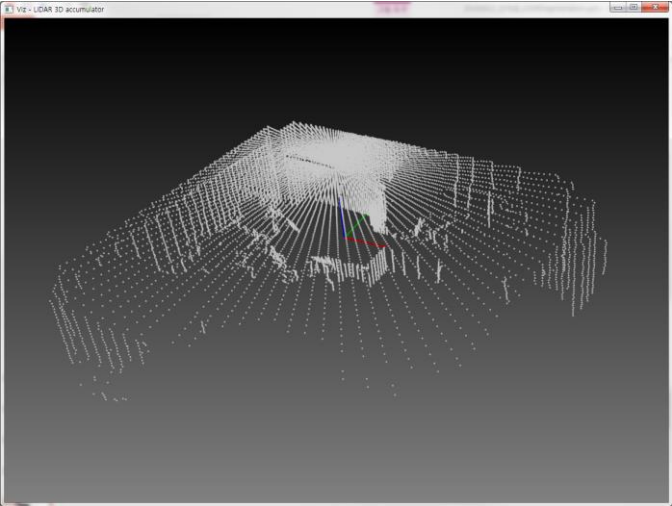
→

B
G
R
[0,255]



04

Result



Q & A
