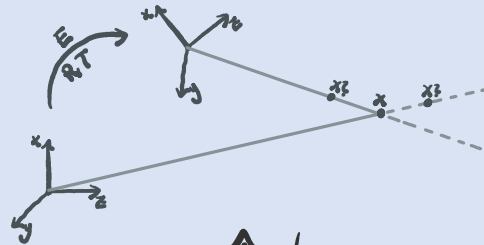# 3D RECONSTRUCTION OF ROOM
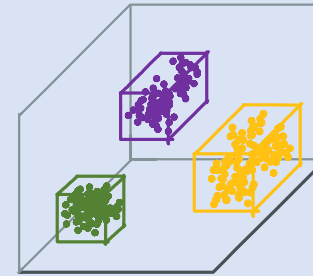
## 1 FIND & MATCH FEATURES

## 3 TRIANGULATION

## 5 OBJECT DETECTION
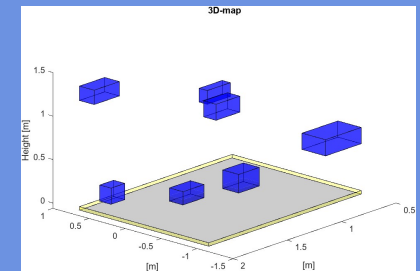
## 2 ESTIMATE E → R,T

5 POINT ALGORITHM

$$x_{i+1}^{T} E x_i = 0$$

## 4 FRAME TRANSFORMATION

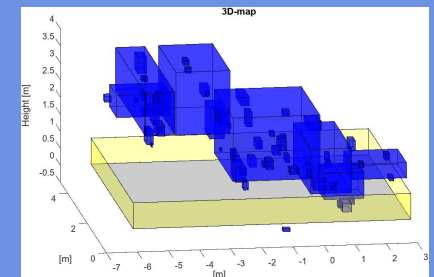$$P_{i+1} = \begin{bmatrix} R & T \\ 0 & 1 \end{bmatrix} \begin{bmatrix} P_i \\ 1 \end{bmatrix} = R P_i + T$$

## RESULTS

### OFFICE

Source: office dataset from ETH3D, https://www.eth3d.net/datasets

### OTHER

## CHALLENGES

- Not all pictures in sequence have enough matches to create E
- Traveling salesman problem – NP hard
- Not deterministic  - MSAC
- More possible poses from inaccurate E
- Fitting boxes to 3D-points, rotation and minimum volume

## DEPLOYED ALGORITHMS

**1**
detectHarrisFeatures
extractFeatures
matchFeatures

**2**
estimateEssentialMatrix
estrelpose

**3**
 triangulate

**4**
cameraProjection
transformPointsForward

**5**
dbscan

## REFERENCES

- Harris, C., and M. Stephens, "A Combined Corner and Edge Detector," *Proceedings of the 4th Alvey Vision Conference*, August 1988, pp. 147-151

- Nister, D.. "An Efficient Solution to the Five-Point Relative Pose Problem." *IEEE Transactions on Pattern Analysis and Machine Intelligence.* Volume 26, Issue 6, June 2004, 756-770.

## GitHub

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