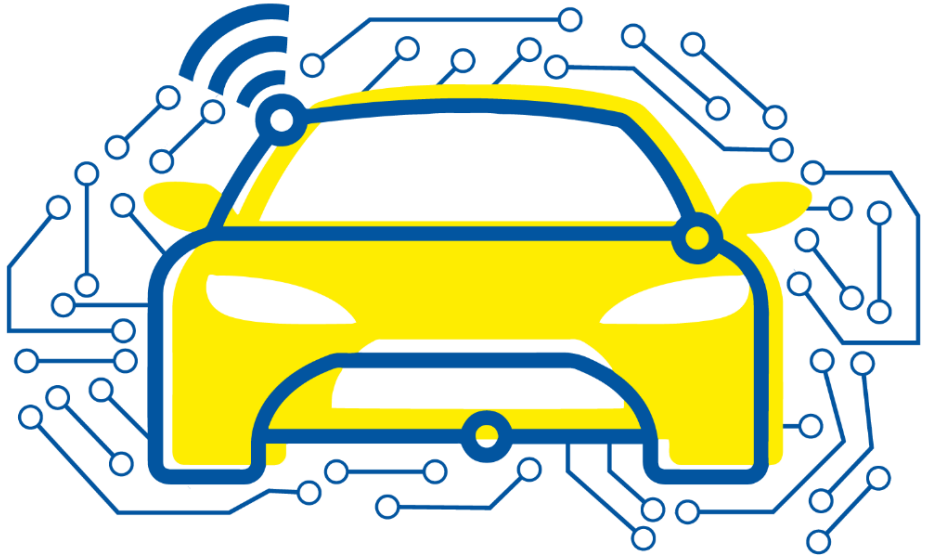
Automated and Connected Driving Challenges

Section 2 – Sensor Data Processing

Semantic Point Cloud Segmentation Evaluation



Bastian Lampe

Institute for Automotive Engineering

Semantic Point Cloud Segmentation – Evaluation

Mean Intersection over Union

- Metric for evaluating the **segmentation performance**
- Compare the prediction with ground truth label
- **Intersection over Union** for class c

$$\text{IoU}_c = \frac{TP_c}{TP_c + FN_c + FP_c}$$

- **Mean Intersection over Union** for all N classes

$$\text{MIoU} = \frac{1}{N} \sum_{c=1}^{N} \frac{TP_c}{TP_c + FN_c + FP_c}$$

- IoU and MIoU are in range [0, 1]

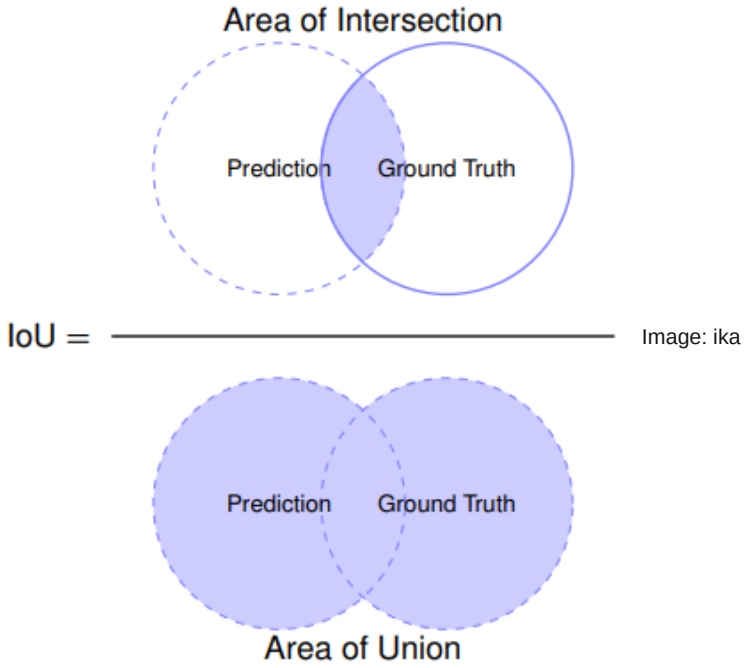


Image: ika

Semantic Point Cloud Segmentation – Evaluation

Datasets and Benchmarks

Semantic KITTI

- Classes similar to Cityscapes
- 23201 training samples
- 20351 validation samples
- Velodyne HDL-64E

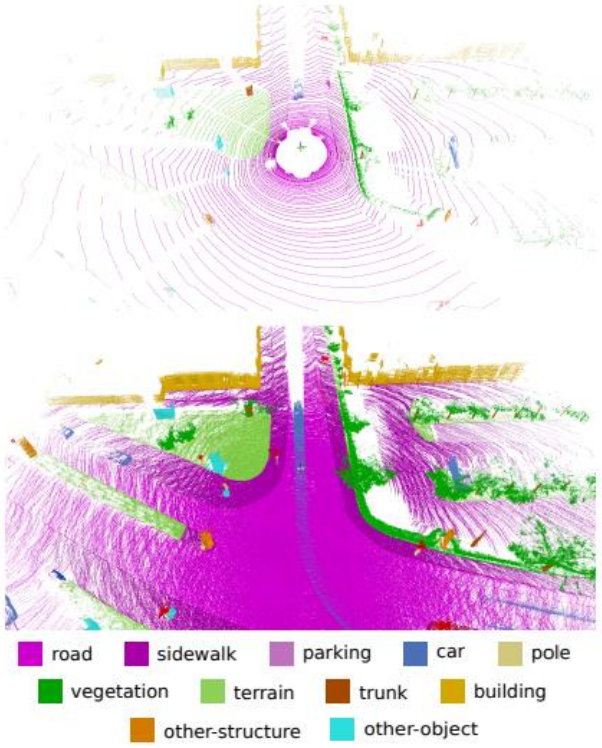


Image: Semantic-Kitti

Leaderboard

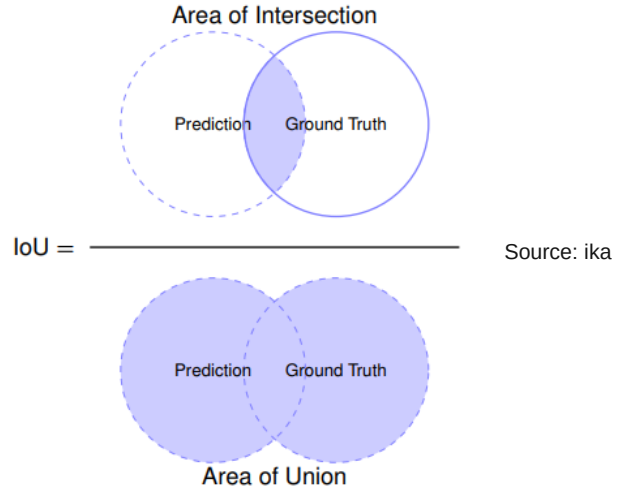
Approach	Paper	Code	mIoU	Classes (IoU)
RPVNet			70.3	
AF2S3Net			69.7	
Cylinder3D			67.8	
SPVNAS			66.4	
JS3C-Net			66.0	
AMVNet			65.3	
Lite-HDSeg			63.8	
TORNADONet			63.1	
KPRNet			63.1	

Image: Semantic-Kitti

Semantic Point Cloud Segmentation – Evaluation

Summary

- **Mean Intersection Over Union** is the most frequently used metric for evaluation semantic segmentation



Source: ika

- Semantic KITTI is a popular public **benchmark** and **dataset**

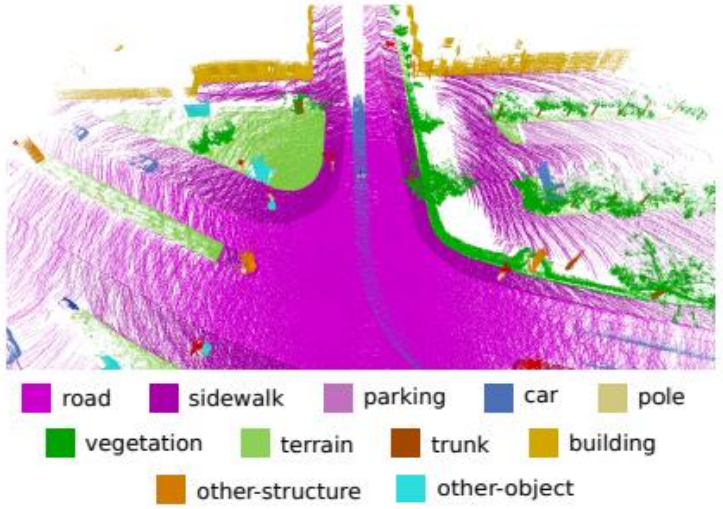


Image: Semantic-Kitti