Automated and Connected Driving Challenges
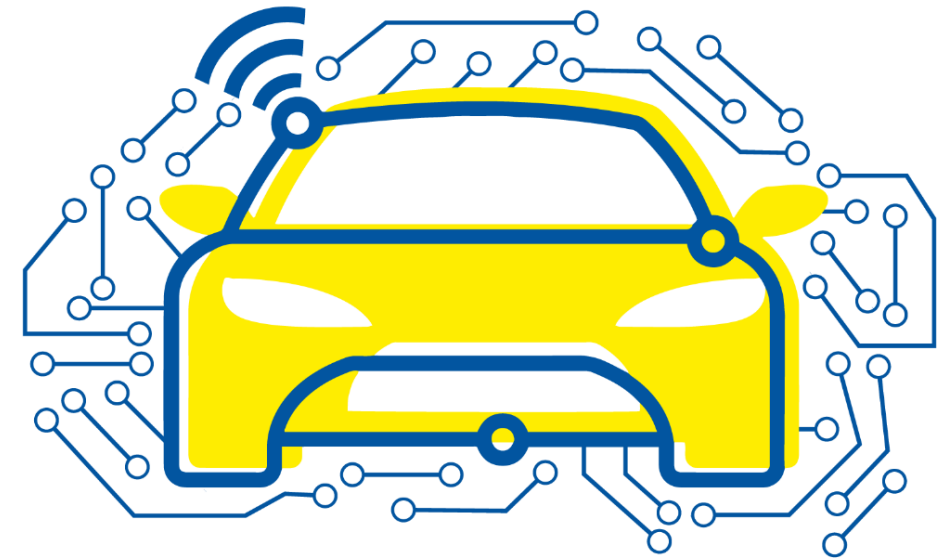
Section 2 – Sensor Data Processing

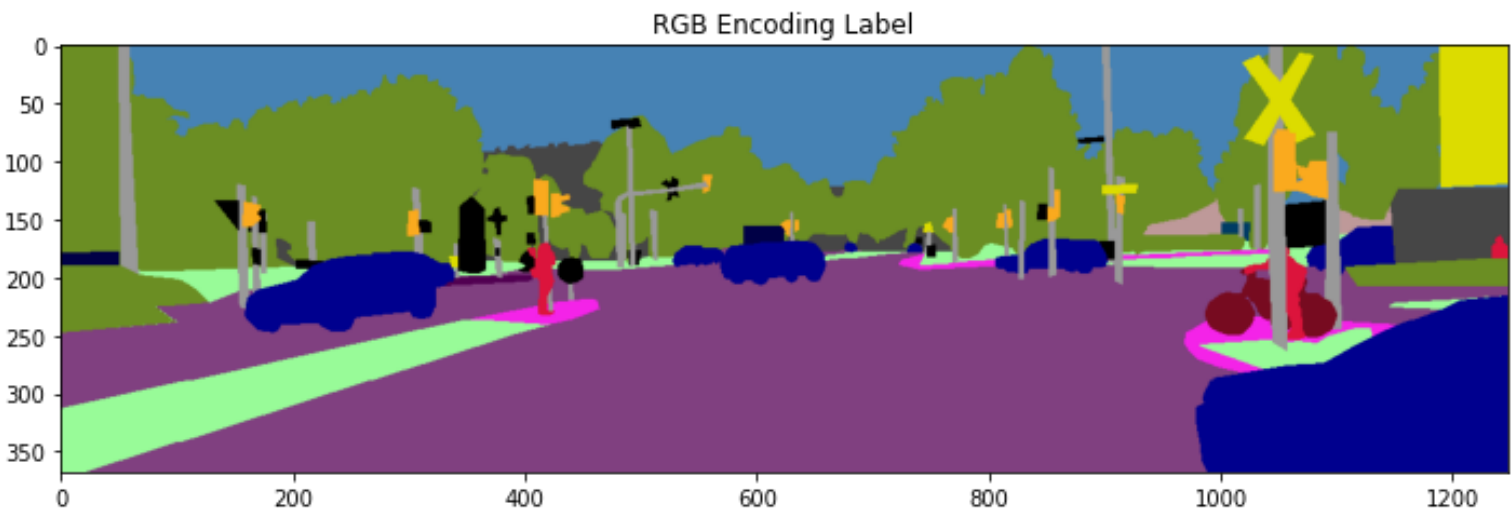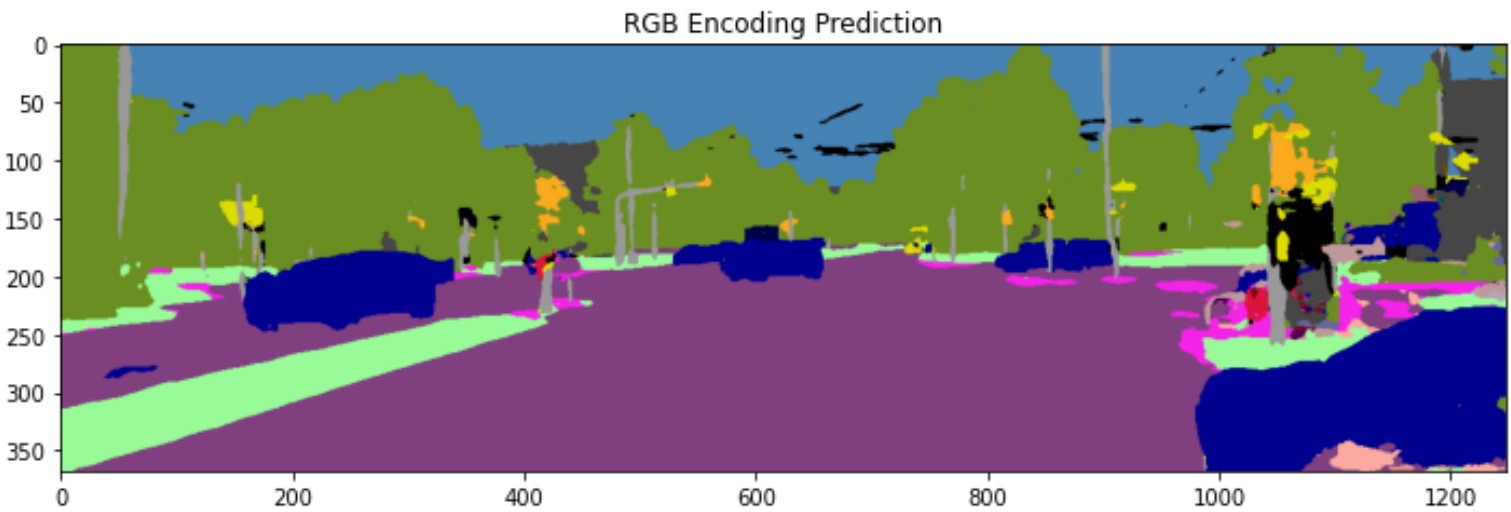Semantic Image Segmentation

Evaluation

Bastian Lampe

Institute for Automotive Engineering

Semantic Image Segmentation – Evaluation

Mean Intersection over Union

Semantic Image Segmentation – Evaluation

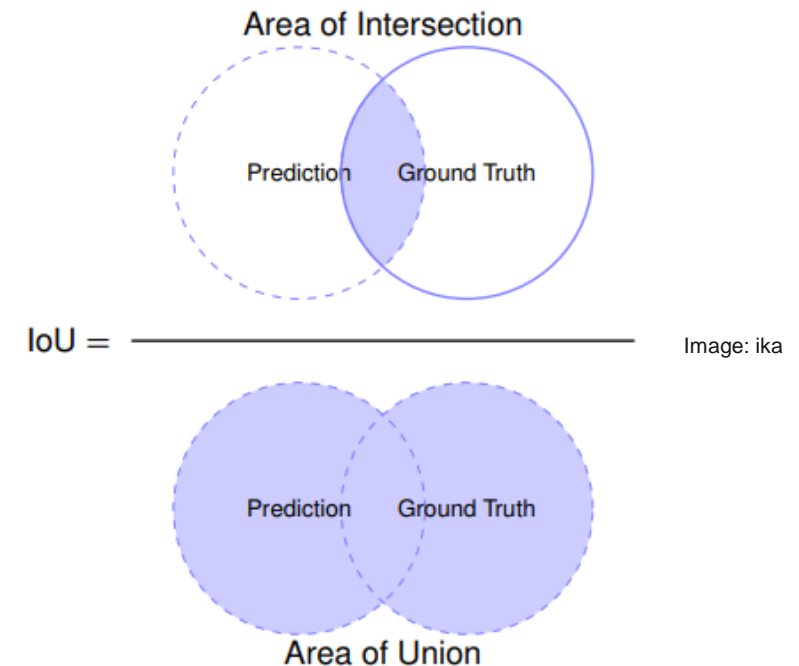## *Mean Intersection over Union*

- Metric for evaluating the **segmentation performance**

- Compare the prediction with ground truth label

- **Intersection over Union** for class c

$$IoU_c = \frac{TP_c}{TP_c + FN_c + FP_c}$$

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

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

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

Image: ika

Semantic Image Segmentation – Evaluation

Datasets and Benchmarks

Cityscapes Benchmark

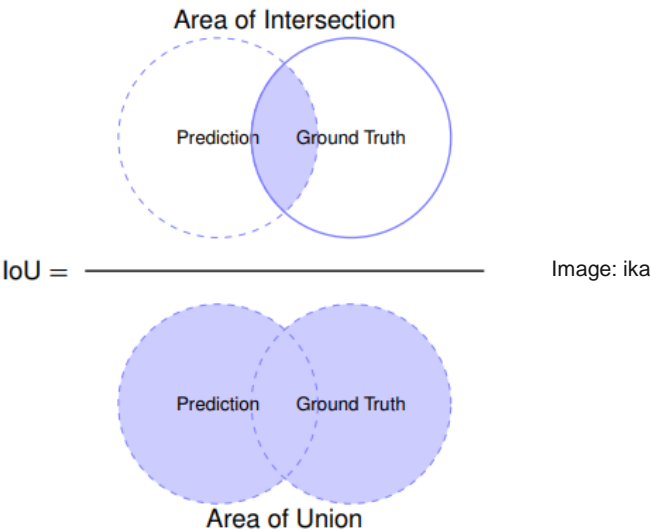| name	fine	coarse	16-bit	depth	video	sub	IoU class	iIoU class	IoU category	iIoU category
AntGroup-AI-VisionAlgo	yes	yes	no	no	no	no	86.1	71.3	93.2	84.7
DAHUA-ARI	yes	yes	no	no	no	no	85.8	70.6	93.2	85.4
Qualcomm AI Research	yes	no	no	no	no	no	85.6	71.2	92.9	85.4
Hierarchical Multi-Scale Attention for Semantic Segmentation	yes	yes	no	no	no	no	85.4	70.4	93.2	85.4
DCNAS+ASPP [Mapillary Vistas]	yes	yes	no	no	no	no	85.3	70.0	93.1	85.3
UJS_model	yes	no	no	no	no	no	85.3	70.5	93.1	85.1

Source: Cityscapes

Semantic Image Segmentation – Evaluation

Summary

Image: ika

- **Mean Intersection Over Union** is an important metric for evaluating semantic segmentation

$$IoU = \frac{\text{Area of Intersection}}{\text{Area of Union}}$$

- Several different public **benchmarks** and **datasets** exist

name	fine	coarse	16-bit	depth	video	sub	IoU class	iIoU class	IoU category	iIoU category
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Source: Cityscapes