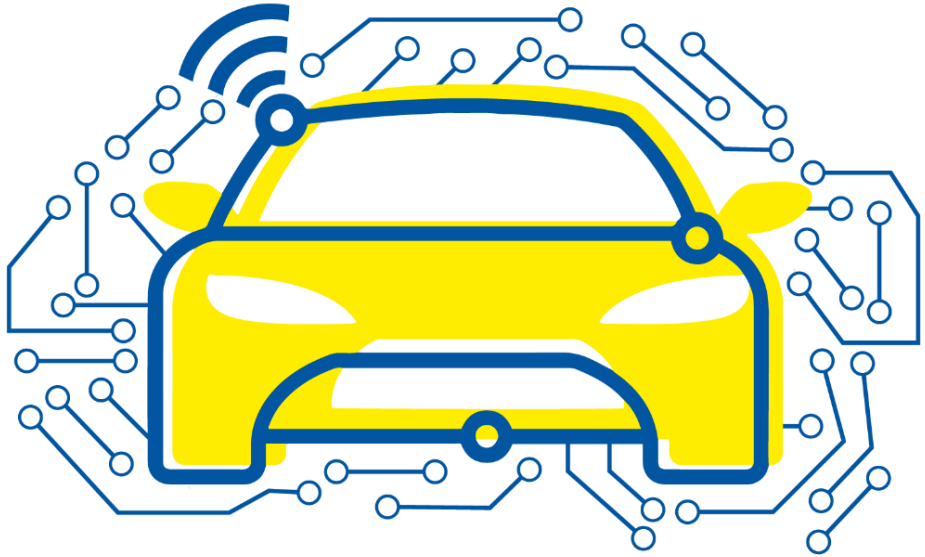
Automated and Connected Driving Challenges

Section 2 – Sensor Data Processing

Semantic Point Cloud Segmentation Tasks



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Semantic Point Cloud Segmentation – Tasks

Point Cloud Segmentation Basics

- **Assignment:**
  “Semantic Point Cloud Segmentation”
  - Jupyter Notebook (Python)
  - Load a dataset for semantic image segmentation
  - Visualize a segmented point cloud
  - Train a model for semantic point cloud segmentation
  - Perform inference on a model

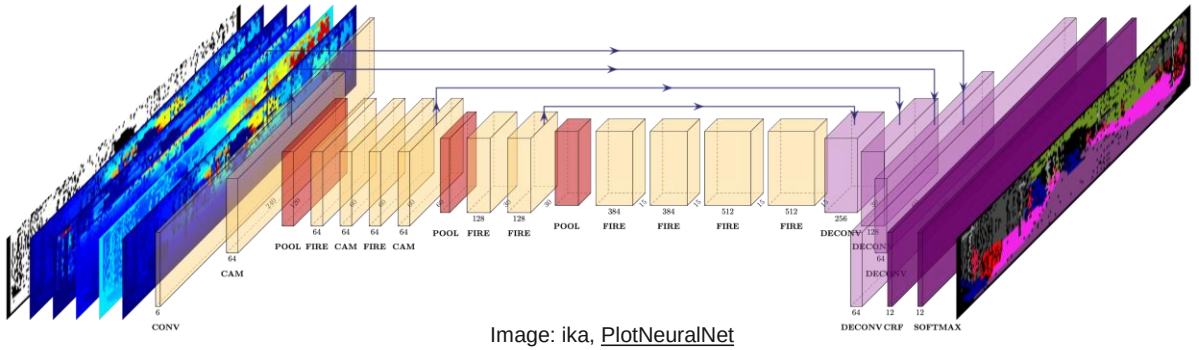

Image: ika, PlotNeuralNet

- **Assignment:**
  “Include Point Cloud Segmentation in ROS”
  - ROS Node (Python)
  - Perform inference on real point cloud recordings
  - Visualize the model output with ROS

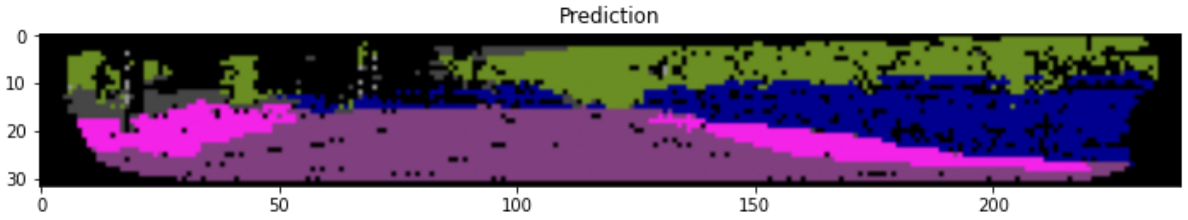

Image: ika

Semantic Point Cloud Segmentation – Tasks

Boosting Semantic Point Cloud Segmentation

- **Assignment:**
  “Boosting Point Cloud Segmentation”
  - Jupyter Notebook (Python)
  - Implement an augmentation function for **flipping** the LiDAR point cloud
  - Implement an augmentation function for **shifting** the LiDAR point cloud
  - Implement **Focal Loss** as loss function for training the model

$$FL = -\sum_{i}^{C} (1 - p_i)^{\gamma} (\mathrm{t_i} \log(p_i))$$

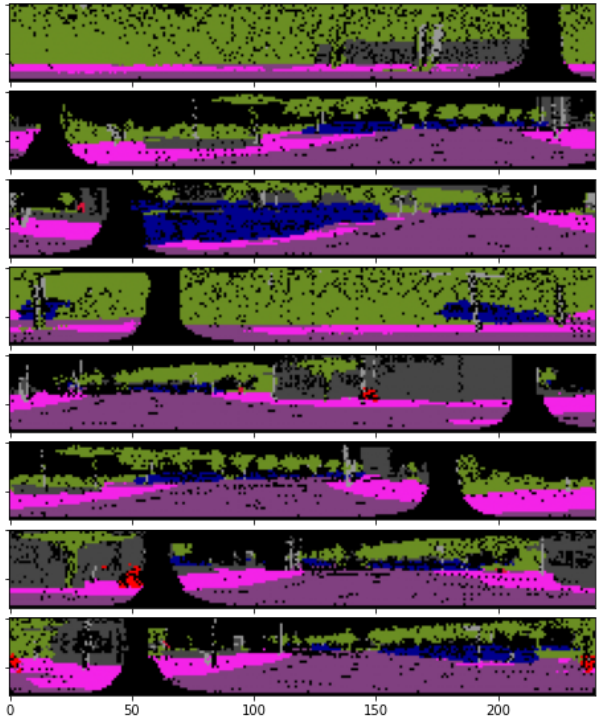

Image: ika