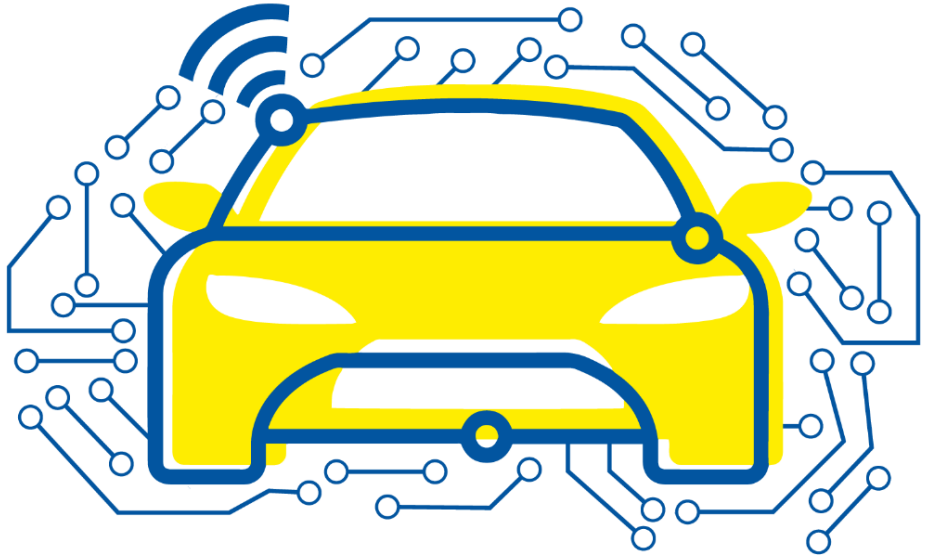
Automated and Connected Driving Challenges

Section 2 – Sensor Data Processing

Camera-based Semantic Grid Mapping

Introduction



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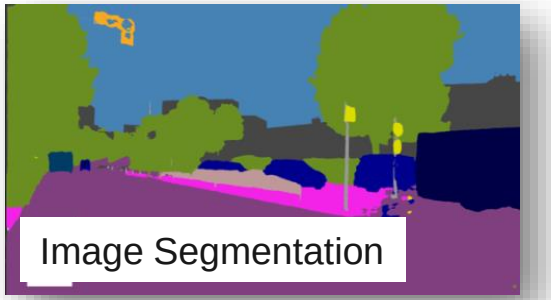
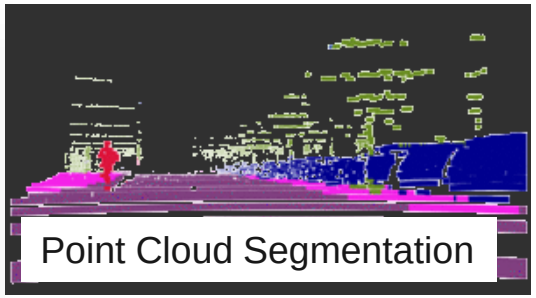
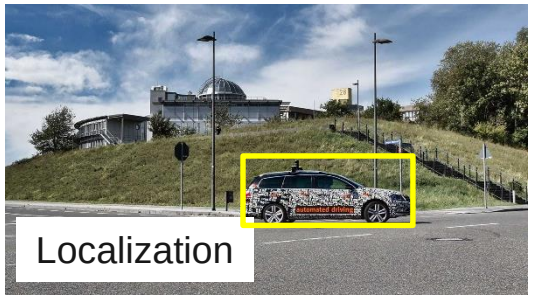
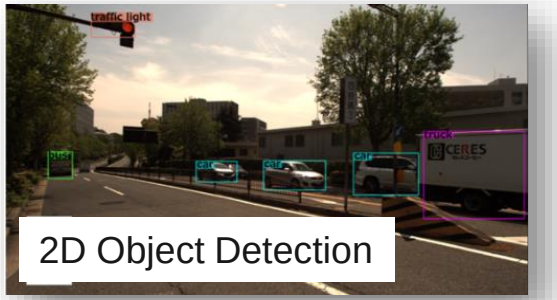
Camera-based Semantic Grid Mapping – Introduction

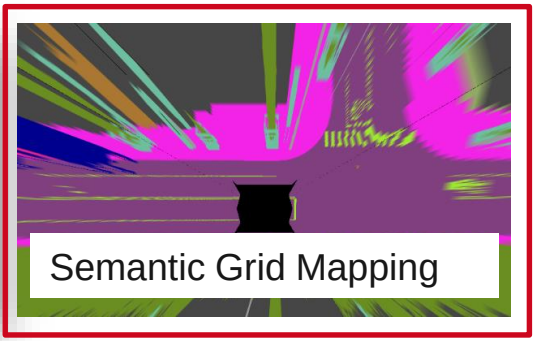
Computer Vision Approaches











Single Object

Multi Objects

Images: fka, ika, IEEE Access

Camera-based Semantic Grid Mapping – Introduction

Semantic Grid Maps

- **Semantic Grid Maps**
  - Each cell contains a semantic description of its content
  - Semantic classes
    - Road, Sidewalk, Vehicle, …
  - 360° camera setup necessary if computed from cameras
  - Gives a *more detailed* environment than occupancy grid mapping but also *harder task*, more *error prone*!

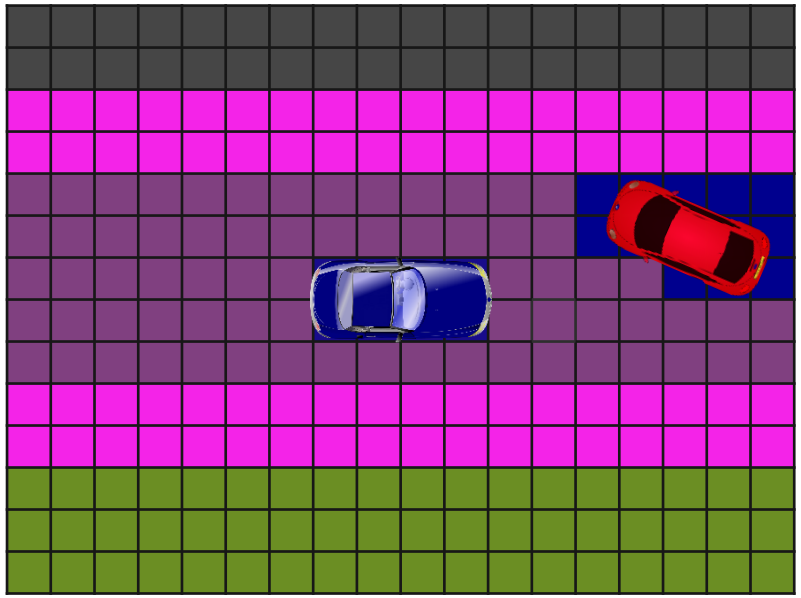
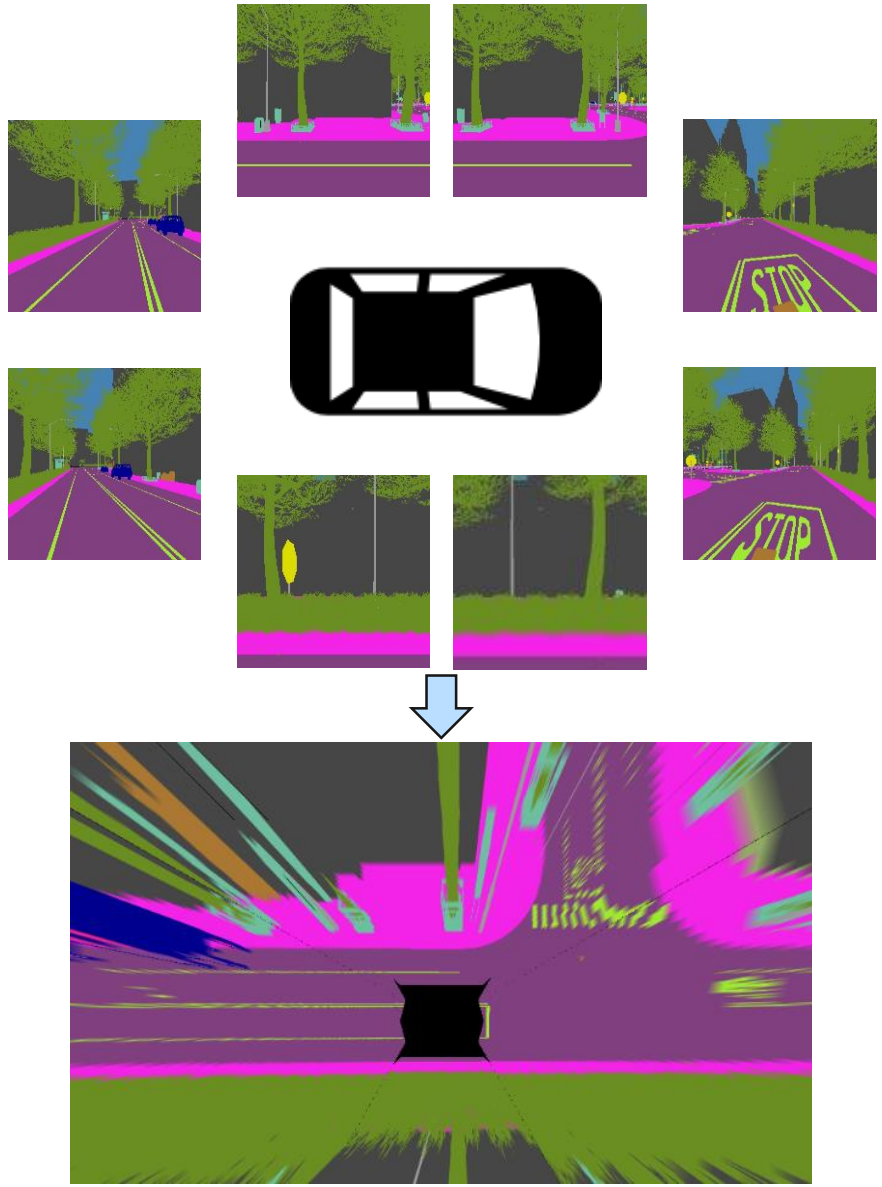


Image: ika



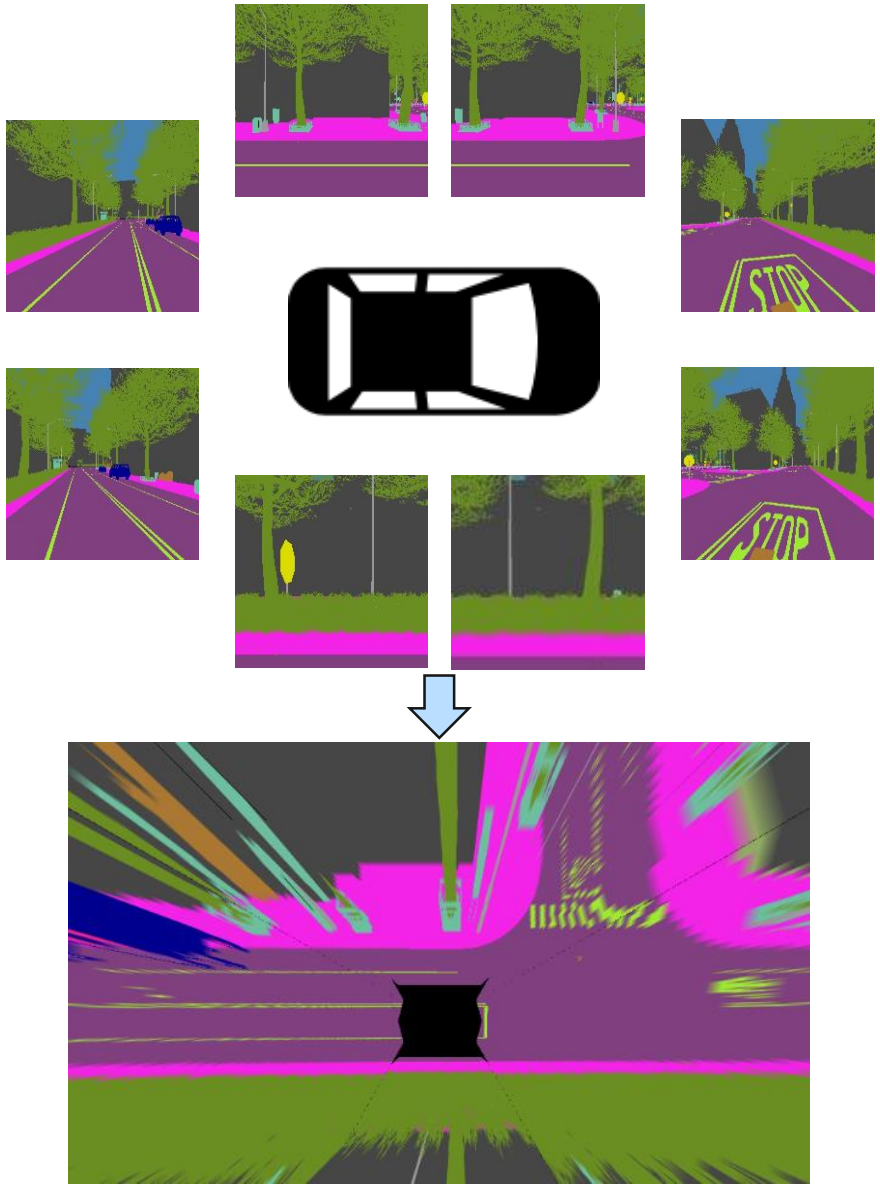
Images: ika

Camera-based Semantic Grid Mapping – Introduction

Approaches

- **Geometry-based** approach:
  - Inverse Perspective Mapping (IPM)
- **Deep Learning-based** approaches:
  - Directly predict a semantic grid representation
  - Example: Cross-View uses an attention-based architecture to perform the view transformation
- **Hybrid** approaches
  - Guide Deep Learning Approaches with geometric approaches
  - Example: Cam2BEV uses IPM to compute Semantic Grid Map and corrects the BEV using a deep learning approach

→ Geometry-based in this subsection



Images: ika