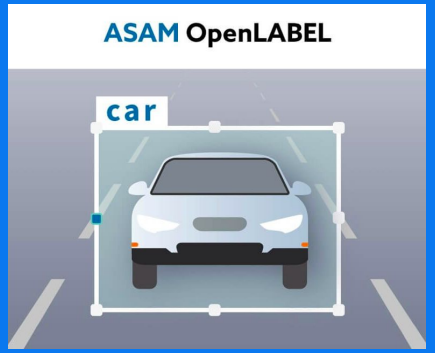


OpenLABEL 1.0 Standard

WP 3 : Object and Scene Labeling

Goal of this slot:

- Brief overview
  - What is already included in the current version
  - What will be included in the future
  - Reasoning behind our decisions

Tim Rädsch
Technical Project Manager
understand.ai

Feel free to ask questions or contact us regarding OpenLABEL.

Truck or Car?

Every day challenges

Use the chat: Enter **1** for **Truck** | Enter **2** for **Car**

Truck or Car?

It depends on your definition

Class: Truck

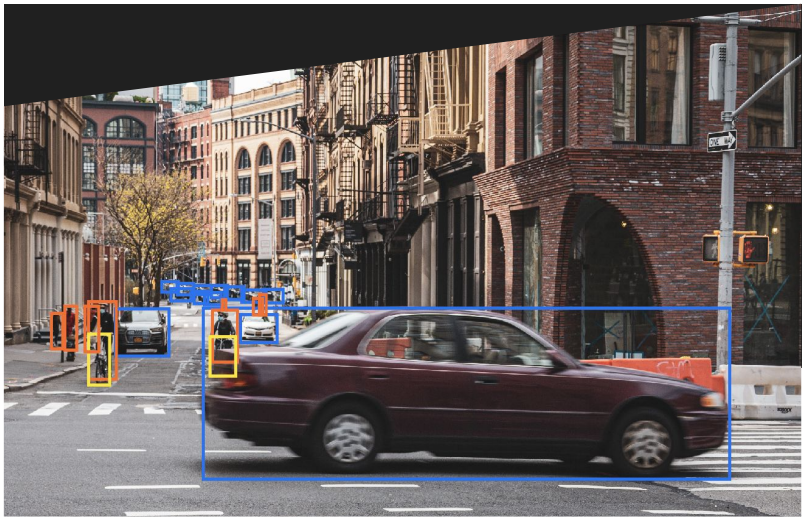
Class: Car

Class: Pickup

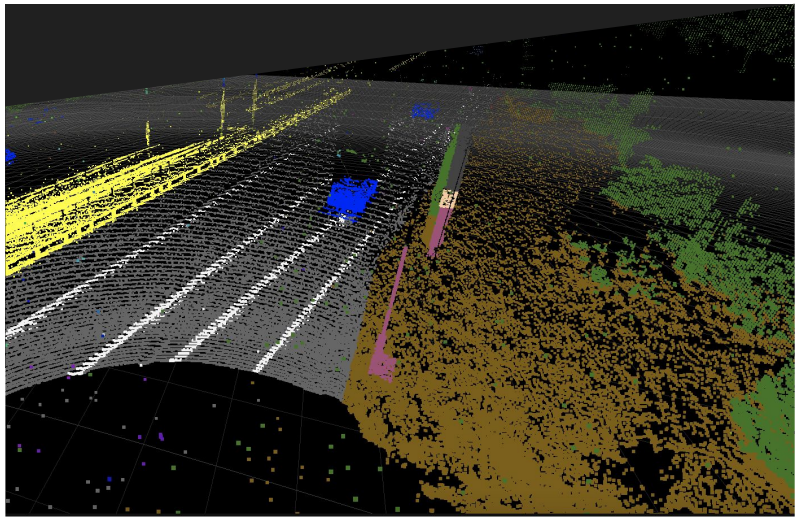
Definition can already change with the department next door.

Which sensor modalities are included?

Camera



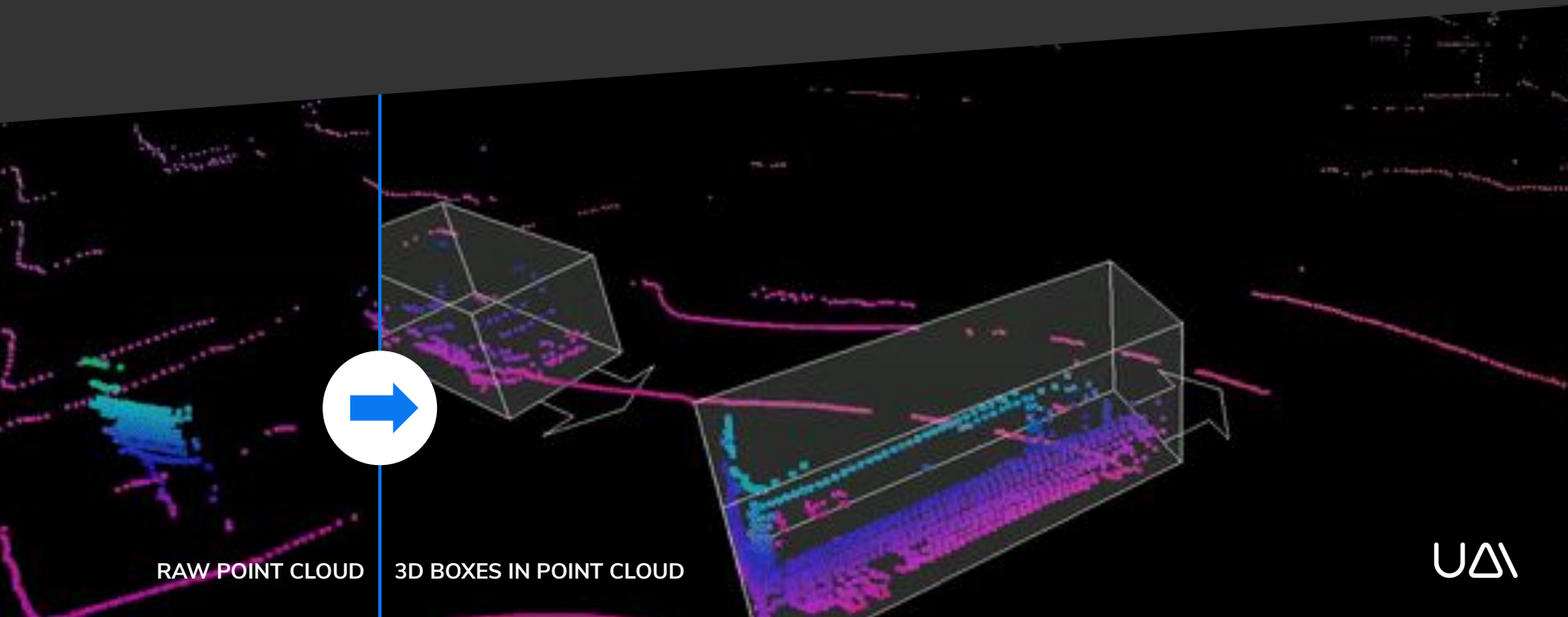
Pointclouds



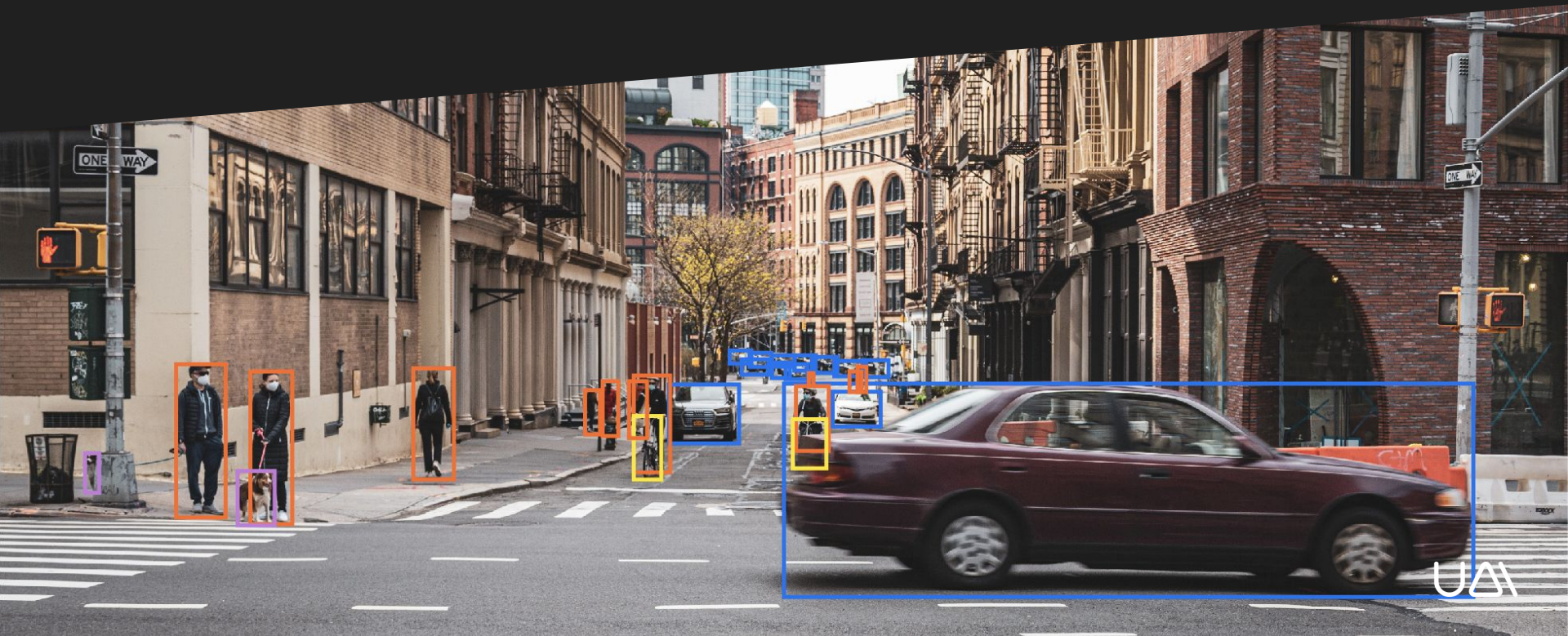
Which annotation types are included (from the beginning)?

- Understand requirements of stakeholders
- Focus on joint consensus
- Get market acceptance -> OpenLABEL gets used
- Keep requirements in mind during design
- Extend in forthcoming iterations
- Focus topics OpenLabel 1.0:
  - 3D Cuboids
  - 2D Bounding Box
  - 2D Semantic Segmentation (different types)

3D Cuboids



2D Bounding Box

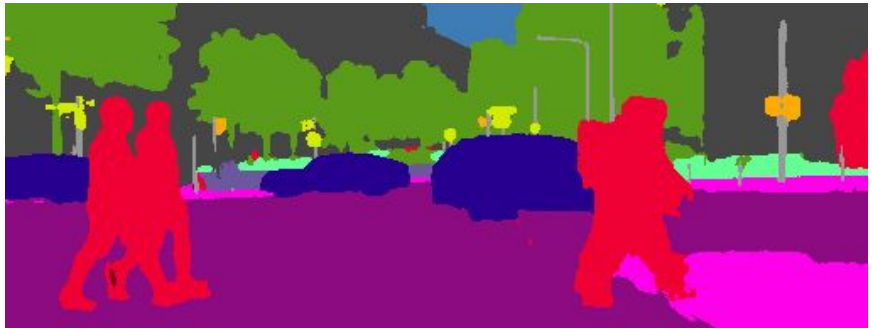


2D Semantic Segmentation

2D Segmentation types

Semantic segmentation taxonomy

- **Partial scene Segmentation** when $\exists p_x \in P : (p_x, c_y) \notin R_{seg}$. There are some pixels that have no classes associated with them. In this case $D \subset P$
- **Full scene Segmentation** when $\forall p_x \in P, \exists c_y \in C : (p_x, c_y) \in R_{seg}$. All the pixels have a class associated. In this case D coincides with P. Notice that in the case we use the class "unlabeled", or "other" to indicate all the pixels outside the real classes of interest, we are still performing a form of full scene segmentation.
- **Single-class per pixel Segmentation** when $\forall p_x \in D, \exists! c_y \in C : (p_x, c_y) \in R_{seg}$ This is the case when each labeled pixel is associated with exactly one class.
- **Multi-class per pixel Segmentation** when $\exists p_x \in D, \exists c_1, c_2 ... c_k \in C : (p_x, c_1), (p_x, c_2), ... (p_x, c_k) \in R_{seg}$ This is the case when at least one labeled pixel is associated with more than one class.



Out of scope for version 1.0

© https://paperswithcode.com/lib/torchvision/keypoint-r-cnn

Keypoint-Annotation as specific use case:

- Poses
- Faces
- In-cabin applications
- ....

Out of scope for version 1.0

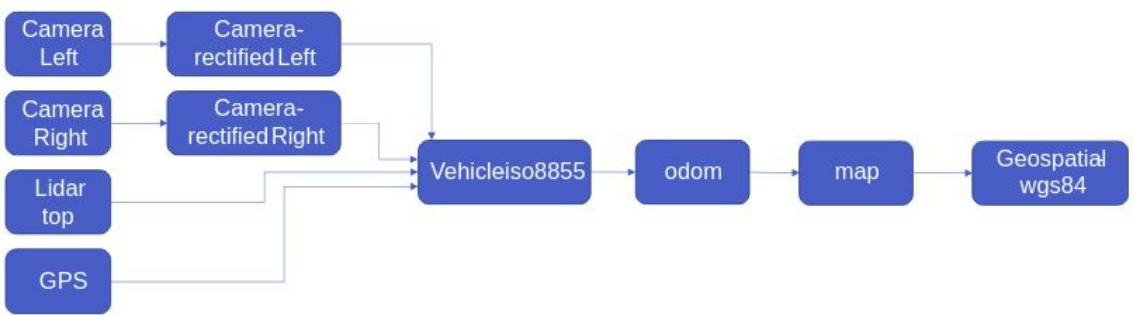
© https://paperswithcode.com/lib/torchvision/keypoint-r-cnn

Keypoint-Annotation as specific use case:

- Poses
- Faces
- In-cabin applications
- ....

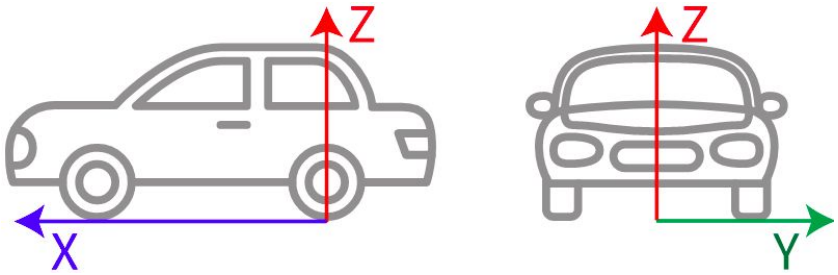
Coordinate systems

- Often source for errors in the annotation industry
    - Mitigate errors where possible
    - Include best practises
- It is also necessary in many cases to understand how the sensor data and the labels relate to the real world
- Transformations are defined - Typical transform trees are presented



Coordinate systems

- Transform – a transformation allowing the coordinates one coordinate-system to be converted into coordinates in another coordinate-system such that they represent the same point in space.
- For rotation, quaternions are used
- The standard comes with extensive explanations



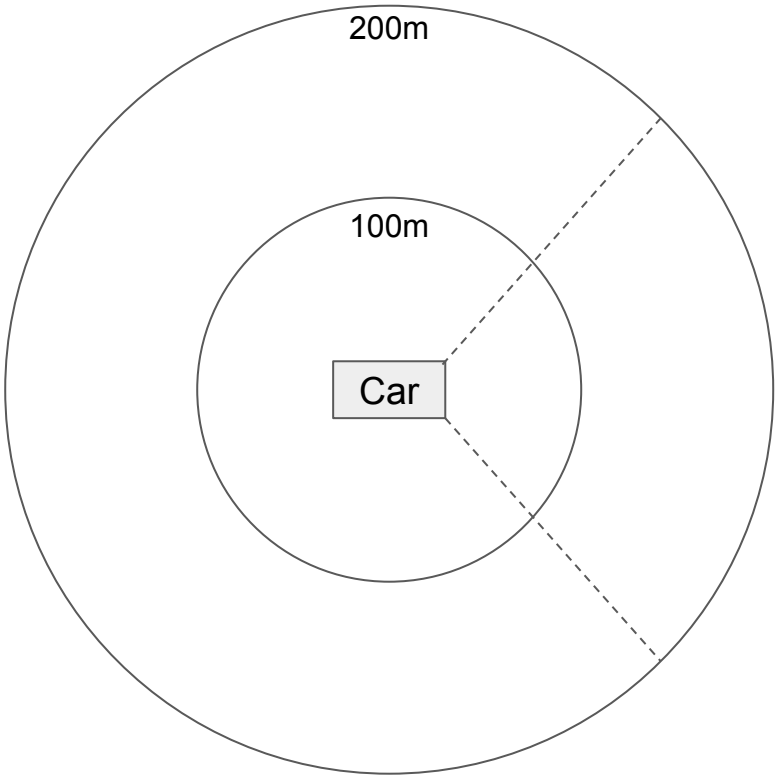
Flexibility - use the standard for your specific applications

1. Extreme points

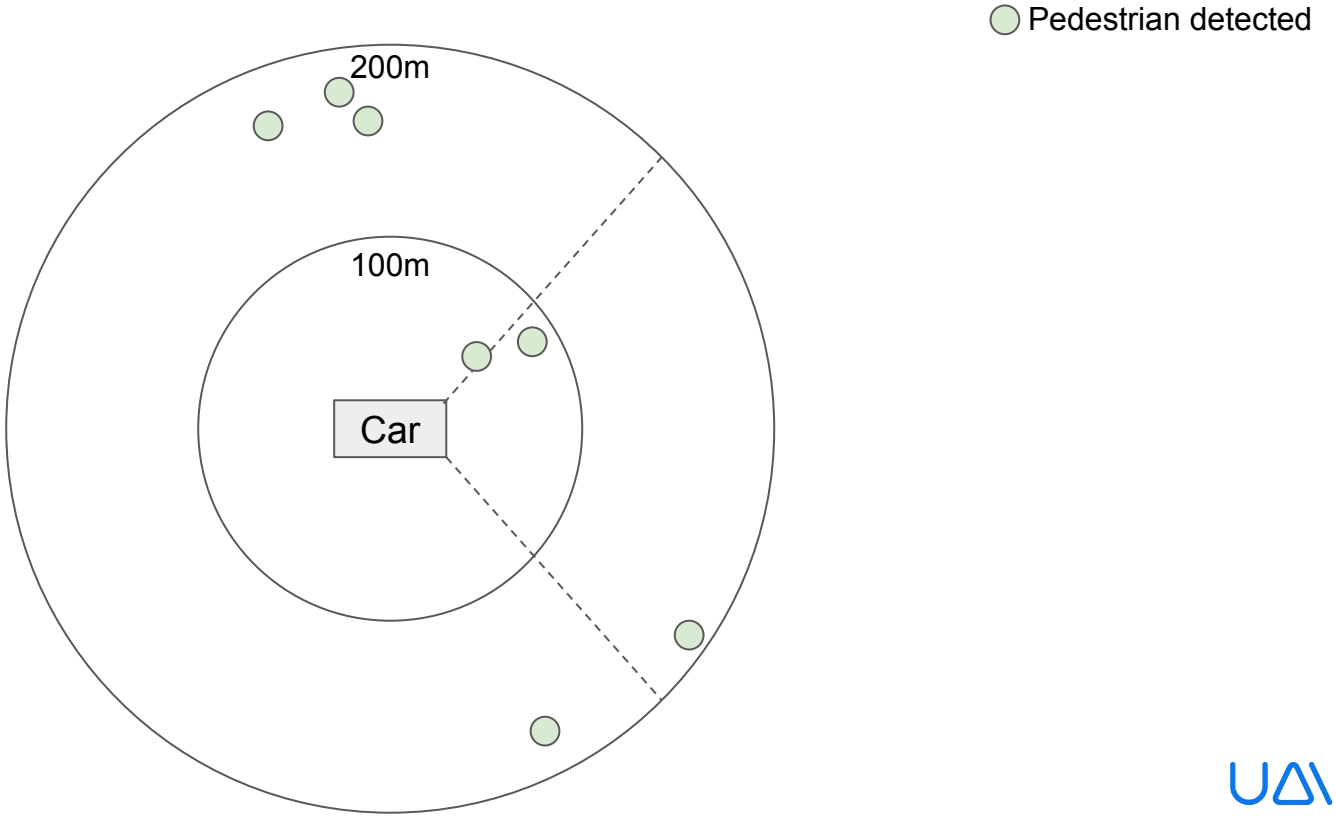
   Define a polygon in addition to a bounding box
2. Customized annotations

   E.g. vertical lines. Define a polygon in addition to a bounding box
3. Covers camera and point cloud data
4. ...

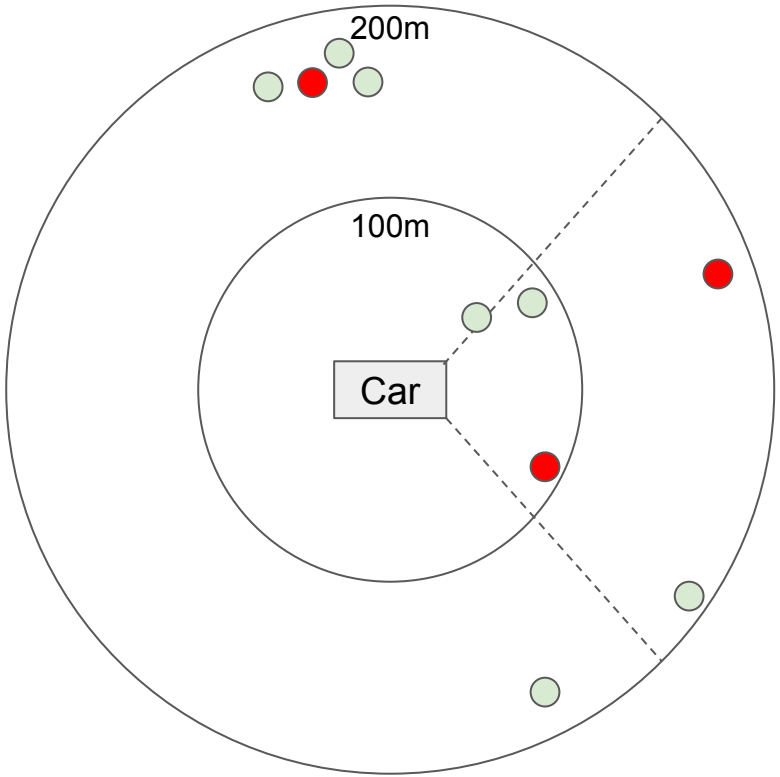
Quality Assurance | What to measure?



Quality Assurance



Quality Assurance



Pedestrian detected

Pedestrian not detected

Quality Assurance

1. Discussed extensively with involved parties
2. All design choices were made with (future) QA aspects in mind
3. To be implemented in the next version of OpenLabel