LABELLING SPECIFICATION

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1 Introduction

This comprehensive document outlines both general and specific labelling specifications and provides detailed instructions for the task of 3D Bounding Box annotation. The primary aim of this document is to facilitate a clear understanding of the labelling process by delineating rules, requirements, and examples.

In the 3D Bounding Box annotation task, the primary objective is to accurately define a three-dimensional enclosure around a designated object within a specified scene or environment. Unlike 2D bounding box annotation, which is typically applied to images captured by a camera, 3D bounding box annotation involves working within a three-dimensional spatial context. Consequently, the resulting output file includes precise coordinates and dimensions that precisely define the 3D Bounding Box for the identified object.

This document serves as an invaluable guide, offering detailed insights into the 3D Bounding Box annotation process, including the format of the output file. By following the guidelines outlined herein, annotators can ensure consistency, accuracy, and efficiency in their labelling efforts, ultimately contributing to the overall success of the project.

2 General

2.1 Abbreviations

Abbreviation	Full name	Definition
bbox(es)	Bounding box(es)	-
px	Pixel(s)	-
ID	Identifier	-

2.2 Quality Target

2.2.1 Quality Benchmark

RQ   There shall be an overall quality target of 97%. This precision level encompasses the accuracy and completeness of annotations, adhering to the established guidelines. Meeting this target ensures that the annotated data meets the desired quality criteria.

2.3 Data Structure

2.3.1 Sequences

RQ   Data shall be organized into sequences which are to be labelled separately.
Each sequence shall be assigned a unique ID, provided by the customer. Batch IDs and names provided should not be changed once delivered and should maintain their ID.

2.3.2 Sequence length

RQ   A sequence is defined as a consecutive compilation of sensor data with a sequence length of 20s. The sequences are to be annotated with an annotation frequency of 2 Hz. This results in a sequence length of 40 frames.

2.3.3 Frames

RQ   Data within a sequence is organized into data frames, where each frame has an ID/timestamp containing all relevant sensor and label data.

2.4 Sensors

2.4.1 Equipment

RQ   Five LIDAR sensors are, six radar sensors and four image sensors are used to capture the scene as well as data for position and movement at a given timestamp.

2.4.2 Images

RQ	For objects with few LIDAR or RADAR points, the images shall be used to make sure boxes are correctly sized.
e.g.	If you see that a cuboid is too short in the image view, adjust it to cover the entire object based on the image view.

2.4.3 Lidar Coordinates

RQ	Lidar point clouds use a Cartesian coordinate system with the origin at the centre of the bottom face of the recording vehicle and meters as units. The X axis extends towards the front from the recording vehicles perspective. The Y axis extends towards the left from the recording vehicles perspective. The Z axis extends towards the top from the recording vehicles perspective.

2.4.4 Scanners

RQ	Multiple scanners may be used to capture LIDAR point clouds. All capture points are given as a single merged LIDAR point cloud (LIDAR_FUSED_MC) provided by MAN.

3 3D Bounding Box Annotation

3.1 Instance ID

3.1.1 ID Assignment

ⓘ	Instance IDs are strings of characters that identify objects or labels and are called "token".
RQ	Objects and labels within a sequence shall be given an ID that is unique within the entire sequence and consistent throughout the sequence.
	IDs shall remain consistent and unique even if an object is not present in some of the frames.
	If an object is not present for more than 30 consecutive frames, (based on provided data with 2Hz) it may be assigned a new ID.

3.1.2 Token Format

RQ	IDs shall be of the following format: "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX" where each "X" is one hexadecimal digit.

3.2 Annotation

3.2.1 Object Labelling

ⓘ	
RQ	Objects shall be labelled by encapsulation within a bounding box.
	The boundaries of the bbox shall touch the outermost visible part of the corresponding object.

3.2.2 Extremities

RQ	Do not include vehicle side view mirrors. On the other side, do include other vehicle extremities that are above 1.5 meters high.
e.g.	Crane, arms etc.

3.2.3 Minimum number of points

RQ	Any target object containing at least 1 LIDAR or RADAR point shall be labelled, if the location and shape of the object can be identified.
	Use images for reference when hard to identify.
e.g.	Use the best judgment on correct cuboid position, sizing, and heading.

3.2.4 Instance IDs

RQ	Each bounding box shall be assigned a Token according to *3.1.2 Token Format.*

3.2.5 Cuboid sizing

RQ	Cuboids shall be very tight and as close as possible to the edge of the object without excluding any LIDAR points. There shall be almost no visible space between the cuboid border and the closest point on the object.

3.2.6 Stationary Objects

RQ	Stationary objects moving over time due to errors in the localization shall be given a separate cuboid for every frame.

3.2.7 Connected Objects

RQ	Connected objects shall be included in the same bounding box.
e.g.	Pedestrian carrying a bag, umbrella etc.
	If two or more pedestrians carry the same object, the bounding box of only one of them will include the object.

3.2.8 Orientation

RQ	The bbox orientation shall ensure that the front side of the object is facing forwards for accurate spatial representation.
e.g.	The bbox orientation must align with the longitudinal axis of the vehicle, ensuring that the front bumper is oriented towards the direction of motion when viewed from the front of the vehicle. The bbox orientation of the traffic sign must be configured such that the sign's text or symbols are legible when viewed from the front.

3.3 Scene Tagging

3.3.1 Attributes

RQ	Sequences shall be described with attributes using "*Attribute Name*" defined in the file "*specification.xlsx*" in the sheet "*Sequence Tagging*". Use the value of the "*description*" key of the file "*scene.json*" for the scene tags separated with a semicolon.
e.g.	*description: "weather.clear;area.rural;daytime.noon; …"*

3.4 Annotation Classes

3.4.1 Annotation Classes

RQ	Object labels shall be given an annotation class as specified in the file "*specification.xlsx*" in the sheet "*Class List*".
	Each class is only relevant for the respective given scope.

3.4.2 Multiclass

RQ e.g.	Classes are exclusive to each other and shall not have multiclass. • A construction worker has the only class *"human.pedestrian.construcion_worker"* and shall not have second class like *"human.pedestrian.adult"* etc. • A rider of a vehicle shall not be given an extra bbox and shall be included in the vehicle's bbox. • Police/Ambulance vehicles have only its class and not an extra bbox for the car/bike etc.

3.5 Class Attributes

3.5.1 Attribute Values

RQ	A set of attributes are specified for most classes, each with a set of possible pre-defined values. These are specified in the file "*specification.xlsx*" in the sheet *"Class Attributes"*.

3.5.2 Class Attribute Mapping

RQ	Objects shall be annotated with the class attributes according to their annotated class. The set of attributes corresponding to each class is defined in the file "*specification.xlsx*" in the sheet *"Class Attribute Mapping"*.

3.5.3 Visibility

RQ	The attribute "visibility" defined in the file *"specification.xlsx"* in the sheet *"Class Attributes"* specifies the percentage of object pixels visible in the panoramic view of all cameras.

4 Annotation File Format

4.1 General

The file format is described in *5.2 Annotation File Format Details* and corresponds to the format of the nuScenes data. For more information, see the http://www.nuscenes.org website.

4.2 Image

4.2.1 Image Dimensions

RQ Images consist of a minimum of 1000x500 and a maximum of 3000x2000 pixels.

4.2.2 Image Format

RQ Images shall be in either in the JPEG (ISO/IEC 10918) or the PNG (ISO/IEC 15948) format.

4.3 Lidar

4.3.1 Lidar Clouds

RQ A LIDAR cloud consists of a list of individual LIDAR points.

4.3.2 Lidar points

RQ Each point is characterized by at least three coordinates describing its position in 3D space (*X*, *Y*, *and Z*). More values may be present such as *W* or *deltaT.*

4.3.3 Lidar Files

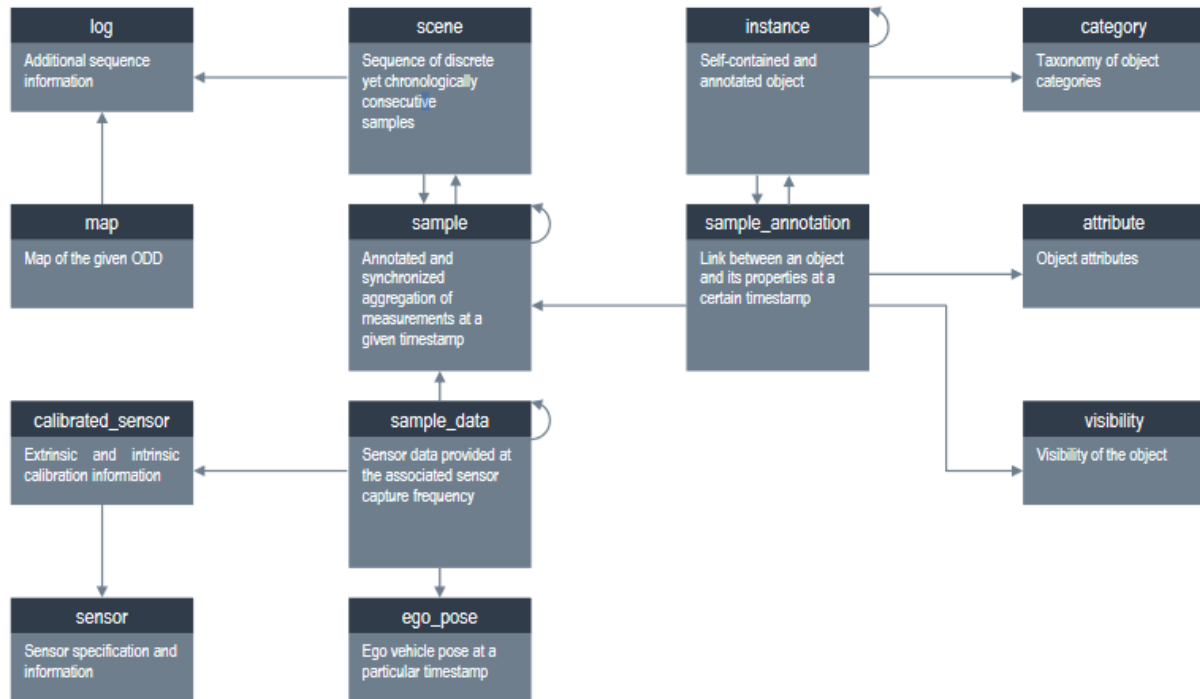
RQ In the file "*sensor.json*" the value of "modality" must be "*lidar*" and for "*channel*" must be "*LIDAR_FUSED_MC*". With "*token*" the corresponding lidar cloud can be found in the "*sample_data.json*" within the "*filename*" attribute.

e.g. *sweeps/LIDAR_FUSED_MC/LIDAR_FUSED_MC_1689252993000051.pcd*

4.3.4 Lidar File Format

RQ The LIDAR cloud file shall be provided in the **pcd** format of the Point Cloud Library.

5 Appendix

5.1 Data Structure Format Details

5.2 Annotation File Format Details

5.2.1 Attribute Description

Description	This object contains information about the attributes of the scene. The *"attribute.json"* file is a machine-readable list of finalized object attributes based on "*specification.xlsx*" in the sheet "*Class Attributes*". In this file, each object attribute is assigned a unique token (Universally Unique Identifier - UUID) and is accompanied by a definition of the attribute.

e.g.	<pre>attribute {
	    "token": <str> -- Unique record identifi
	    "name": <str> -- Attribute name.
	    "description": <str> -- Attribute description.
	}</pre>

5.2.2 Calibrated Sensor Description

Description	This object contains information about the calibrated sensor.
e.g.	

```
calibrated_sensor {
   "token":                   <str> -- Unique record identifier.
   "sensor_token":            <str> -- Foreign key pointing to the sensor
                                       type.
   "translation":             <float> [3] -- Coordinate system origin in
                                             meters: x, y, z.
   "rotation":                <float> [4] -- Coordinate system orientation
                                             as quaternion: w, x, y, z.
   "camera_intrinsic":        <float> [3, 3] -- Intrinsic camera
                                                calibration. Empty for
                                                sensors that are not
                                                cameras.
}
```

5.2.3 Category Description

Description

This object contains information about the objects class.

The *"category.json"* file is a machine-readable list of finalized object classes based on "*specification.xlsx*" in the sheet "*Class List*". In this file, each object class is assigned a unique token (UUID) and is accompanied by a definition of the class.

e.g.

```
category {
   "token":                   <str> -- Unique record identifier.
   "name":                    <str> -- Category name. Subcategories
                                       indicated by period.
   "description":             <str> -- Category description.
}
```

5.2.4 Ego Pose Description

Description	This object contains information about the ego pose.
e.g.	

```
ego_pose {
   "token":                   <str> -- Unique record identifier.
   "translation":             <float> [3] -- Coordinate system origin
                                             in meters: x, y, z. Note
                                             that z is always 0.
   "rotation":                <float> [4] -- Coordinate system orientation
                                             as quaternion: w, x, y, z.
   "timestamp":               <int> -- Unix time stamp.
}
```

5.2.5 Instance Description

Description	This object contains information about the instance. The *"instance.json"* file is a machine-readable list of temporary relationships between annotations and their association with object classes. Instances are identifiable by a unique token (UUID) and reference not only the object class but also the first and last associated annotations, as well as the total number of associated annotations.
e.g.	

```
instance {
   "token":                      <str> -- Unique record identifier.
   "category_token":             <str> -- Foreign key pointing to the object
                                          category.
   "nbr_annotations":            <int> -- Number of annotations of this instance.
   "first_annotation_token":     <str> -- Foreign key. Points to the first
                                          annotation of this instance.
   "last_annotation_token":      <str> -- Foreign key. Points to the last
                                          annotation of this instance.

}
```

5.2.6 Log Description

Description	This object contains information about the log.
e.g.	

```
log {
   "token":                      <str> -- Unique record identifier.
   "logfile":                    <str> -- Log file name.
   "vehicle":                    <str> -- Vehicle name.
   "date_captured":              <str> -- Date (YYYY-MM-DD).
   "location":                   <str> -- Area where log was captured,
                                          e.g. singapore-onenorth.

}
```

5.2.7 Map Description

Description	This object contains information about the map.
e.g.	

```
map {
   "token":                      <str> -- Unique record identifier.
   "log_tokens":                 <str> [n] -- Foreign keys.
   "category":                   <str> -- Map category, currently only
                                          semantic_prior for drivable
                                          surface and sidewalk.
   "filename":                   <str> -- Relative path to the file
                                          with the map mask.

}
```

5.2.8 Sample Description

Description
e.g.

This object contains information about the sample.

```
sample {
   "token":                    <str> -- Unique record identifier.
   "timestamp":                <int> -- Unix time stamp.
   "scene_token":              <str> -- Foreign key pointing to the scene.
   "next":                     <str> -- Foreign key. Sample that follows
                                        this in time. Empty if end of scene.
   "prev":                     <str> -- Foreign key. Sample that precedes
                                        this in time. Empty if start of scene.
}
```

5.2.9 Sample Annotation Description

Description

This object contains information about the sample annotation.

The *"sample_annotation.json"* file is a machine-readable list of all annotations (bounding boxes) describing their position, orientation, extent, visibility, class membership, attributes, and relationships. Annotations are identifiable by a unique token (UUID) and reference their associated instance, attributes, and sample origin. Additionally, they contain references to the previous and following sample's associated annotation (if available) and include the number of associated radar and LIDAR points.

e.g.

```
sample_annotation {
   "token":                    <str> -- Unique record identifier.
   "sample_token":             <str> -- Foreign key. NOTE: this points to a
                                        sample NOT a sample_data since
                                        annotations are done on the sample
                                        level taking all relevant sample_data
                                        into account.
   "instance_token":           <str> -- Foreign key. Which object instance is
                                        this annotating. An instance can have
                                        multiple annotations over time.
   "attribute_tokens":         <str> [n] -- Foreign keys. List of attributes for
                                        this annotation. Attributes can
                                        change over time, so they belong
                                        here, not in the instance table.
   "visibility_token":         <str> -- Foreign key. Visibility may also change
                                        over time. If no visibility is
                                        annotated, the token is an empty string.
   "translation":              <float> [3] -- Bounding box location in meters
                                        as center_x, center_y, center_z.
   "size":                     <float> [3] -- Bounding box size in meters as
                                        width, length, height.
   "rotation":                 <float> [4] -- Bounding box orientation as
                                        quaternion: w, x, y, z.
   "num_lidar_pts":            <int> -- Number of lidar points in this box.
                                        Points are counted during the lidar
                                        sweep identified with this sample.
   "num_radar_pts":            <int> -- Number of radar points in this box.
                                        Points are counted during the radar
                                        sweep identified with this sample.
                                        This number is summed across all
                                        radar sensors without any invalid
                                        point filtering.
   "next":                     <str> -- Foreign key. Sample annotation from
                                        the same object instance that follows
                                        this in time. Empty if this is the
                                        last annotation for this object.
   "prev":                     <str> -- Foreign key. Sample annotation from
                                        the same object instance that precedes
                                        this in time. Empty if this is the
                                        first annotation for this object.
}
```

5.2.10 Sample Data Description

Description	This object contains information about the sample data.
e.g.	

```
sample_data {
    "token":                   <str> -- Unique record identifier.
    "sample_token":            <str> -- Foreign key. Sample to which this
                                        sample_data is associated.
    "ego_pose_token":          <str> -- Foreign key.
    "calibrated_sensor_token": <str> -- Foreign key.
    "filename":                <str> -- Relative path to data-blob on disk.
    "fileformat":              <str> -- Data file format.
    "width":                   <int> -- If the sample data is an image,
                                        this is the image width in pixels.
    "height":                  <int> -- If the sample data is an image,
                                        this is the image height in pixels.
    "timestamp":               <int> -- Unix time stamp.
    "is_key_frame":            <bool> -- True if sample_data is part of
                                         key_frame, else False.
    "next":                    <str> -- Foreign key. Sample data from the
                                        same sensor that follows this in
                                        time. Empty if end of scene.
    "prev":                    <str> -- Foreign key. Sample data from the
                                        same sensor that precedes this in
                                        time. Empty if start of scene.

}
```

5.2.11 Scene Description

Description	This object contains information about the scene.
	The *"scene.json"* file is a machine-readable listing of sequences and their associated information. This file is already provided and is to be augmented with labels for the sequences in accordance with the finalized labels specified in *"specification.xlsx"* in the sheet *"Sequence Tagging".* The value of the key *"description"* shall be used for tagging attributes and describing the scene.
e.g.	

```
scene {
   "token":                   <str> -- Unique record identifier.
   "name":                    <str> -- Short string identifier.
   "description":             <str> -- Longer description of the scene.
   "log_token":               <str> -- Foreign key. Points to log from
                                       where the data was extracted.
   "nbr_samples":             <int> -- Number of samples in this scene.
   "first_sample_token":      <str> -- Foreign key. Points to the first
                                       sample in scene.
   "last_sample_token":       <str> -- Foreign key. Points to the last
                                       sample in scene.

}
```

5.2.12 Sensor Description

Description	This object contains information about the sensor.
e.g.	

```
sensor {
    "token":                    <str> -- Unique record identifier.
    "channel":                  <str> -- Sensor channel name.
    "modality":                 <str> -- Sensor modality. Supports
                                         category(ies) in brackets.
}
```

5.2.13 Visibility Description

Description	This object contains information about the visibility.
	The *"visibility.json"* file is a machine-readable list of finalized visibility categories based on *"specification.xlsx"* in the sheet *"Class Attributes"*. In this file, each visibility category is assigned a unique token (UUID) and is accompanied by a definition of the respective visibility level.
e.g.	

```
visibility {
    "token":                    <str> -- Unique record identifier.
    "level":                    <str> -- Visibility level.
    "description":              <str> -- Description of visibility level.
}
```

5.3 Label Details

5.3.1 Scene Tag Definition

Tag no.	Tag Category	Tag Value	Attribute Name	Definition
1	weather	clear	weather.clear	All camera images are characterized by clear sky and sunny weather.
		rain	weather.rain	One or more sensor (camera, lidar) recordings include rain, no matter if light or heavy rain.
		snow	weather.snow	One or more sensor (camera, lidar) recordings show surroundings that are covered with snow or it is snowing in this situation.
		fog	weather.fog	One or more sensor (camera, lidar) recordings include fog.
		hail	weather.hail	One or more sensor (camera, lidar) recordings show surroundings that are covered with hail or it is hailing in this situation.
		overcast	weather.overcast	One or more camera images are characterized by cloudy weather.
		other_weather	weather.other_weather	Weather situations that cannot be classified as one of the other weather situations.
2	area	highway	area.highway	The current driving situation is recorded on a highway, freeway or motorway.
		rural	area.rural	The current driving situation is recorded in a rural environment.
		terminal	area.terminal	The current driving situation is recorded in a terminal or logistic hub environment.
		parking	area.parking	The current driving situation is recorded on a parking lot, rest area or gas station.
		city	area.city	The current driving situation is recorded within a city environment.
		residential	area.residential	The current driving situation is recorded in a residential environment in a rural area or country side.
		other_area	area.other_area	Surrounding area that cannot be classified as one of the other areas.
3	daytime	morning	daytime.morning	The recording was conducted between 06:00 am to 10:59 am.
		noon	daytime.noon	The recording was conducted between 11:00 am to 17:59 pm.
		evening	daytime.evening	The recording was conducted between 18:00 pm to 20:59 pm.
		night	daytime.night	The recording was conducted between 21:00 pm to 05:59 am.
4	season	spring	season.spring	The recording was conducted between the 20th of March to the 20th of June (inclusive).
		summer	season.summer	The recording was conducted between the 21th of June to the 22th of September (inclusive).
		autumn	season.autumn	The recording was conducted between the 23th of September to the 20th of December (inclusive).
		winter	season.winter	The recording was conducted between the 21th of December to the 19th of March (inclusive).
5	lighting	illuminated	lighting.illuminated	All camera images are well illuminated.
		glare	lighting.glare	One or more camera images are overexposed or affected by glare or very bright light.
		dark	lighting.dark	One or more camera images are underexposed or characterized by dark areas.
		twilight	lighting.twilight	One or more camera images are taken in twilight, dusk or dawn.
		other_lighting	lighting.other_lighting	Lighting situations that cannot be classified as one of the other lighting situations.
6	structure	tunnel	structure.tunnel	Whether the recording was conducted within a tunnel.
		bridge	structure.bridge	Whether the recording was made on a bridge overpassing areas that are not used by other traffic participants, like water or landscapes.
		underpass	structure.underpass	Whether the recording was conducted during an underpass of an area used by other traffic participants, like roads or rail lines.
		overpass	structure.overpass	Whether the recording was conducted during an overpass of an area used by other traffic participants, like roads or rail lines.
		regular	structure.regular	Driving situations that are not recorded on one of the other structures.
7	construction	roadworks	construction.roadworks	Whether the recording was conducted within a construction side or driving situations including roadworks or temporary street layouts.
		unchanged	construction.unchanged	Driving situations that are not classified by one of the other construction tags.

5.3.2 Annotation Category Definition

Class no.	Category Name	Definition
1	vehicle.car	Vehicle designed primarily for personal use, e.g. sedans, hatch-backs, wagons, vans, mini-vans, SUVs and jeeps.
2	vehicle.truck	Vehicles primarily designed to haul cargo including pick-ups, lorrys, trucks and semi-tractors. Trailers hauled after a semi-tractor should be labeled as "Trailer". A pickup truck is a light duty truck with an enclosed cab and an open or closed cargo area. A pickup truck can be intended primarily for hauling cargo or for personal use. Tractor part of a semi trailer truck. Trailers hauled after a semi-tractor should be labeled as a trailer.
3	vehicle.bus.bendy	Buses and shuttles designed to carry more than 10 people and comprises two or more rigid sections linked by a pivoting joint. Annotate each section of the bendy bus individually.
4	vehicle.bus.rigid	Rigid buses and shuttles designed to carry more than 10 people.
5	vehicle.construction	Vehicles primarily designed for construction. Typically very slow moving or stationary. Cranes and extremities of construction vehicles are only included in annotations if they interfere with traffic. Trucks used to hauling rocks or building materials are considered trucks rather than construction vehicles.
6	vehicle.motorcycle	Gasoline or electric powered 2-wheeled vehicle designed to move rapidly (at the speed of standard cars) on the road surface. This category includes all motorcycles, vespas and scooters. It also includes light 3-wheel vehicles, often with a light plastic roof and open on the sides, that tend to be common in Asia. If there is a rider and/or passenger, include them in the box.
7	static_object.bicycle_rack	Area or device intended to park or secure the bicycles in a row. It includes all the bicycles parked in it and any empty slots that are intended for parking bicycles. Bicycles that are not part of the rack should not be included. Instead they should be annotated as bicycles separately.
8	vehicle.bicycle	Human or electric powered 2-wheeled vehicle designed to travel at lower speeds either on road surface, sidewalks or bicycle paths. If there is a rider and/or passenger, include them in the box.
9	vehicle.trailer	Any vehicle trailer, both for trucks, cars and motorcycles (regardless of whether currently being towed or not). For semi-trailers (containers) label the truck itself as "Truck".
10	vehicle.emergency.police	All types of police vehicles including police bicycles and motorcycles.
11	vehicle.emergency.ambulance	All types of ambulances.
12	human.pedestrian.adult	An adult pedestrian moving around the cityscape. Mannequins should also be annotated as Adult Pedestrian.
13	human.pedestrian.child	A child pedestrian moving around the cityscape.
14	human.pedestrian.construction_worker	A human in the scene whose main purpose is construction work.
15	human.pedestrian.stroller	Any stroller. If a person is in the stroller, include in the annotation. If a pedestrian pushing the stroller, then they should be labeled separately.
16	human.pedestrian.wheelchair	Any type of wheelchair. If a pedestrian is pushing the wheelchair then they should be labeled separately.
17	human.pedestrian.personal_mobility	A small electric or self-propelled vehicle, e.g. skateboard, segway, or scooters, on which the person typically travels in a upright position. Driver and (if applicable) rider should be included in the bounding box along with the vehicle.
18	human.pedestrian.police_officer	Any type of police officer, regardless whether directing the traffic or not.
19	animal	All animals, e.g. cats, rats, dogs, deer, birds.
20	movable_object.trafficcone	All types of traffic cones.
21	movable_object.barrier	Any metal, concrete or water barrier temporarily placed in the scene in order to re- direct vehicle or pedestrian traffic. In particular, includes barriers used at construction zones. If there are multiple barriers either connected or just placed next to each other, they should be annotated separately.
22	movable_object.pushable_pullable	Objects that a pedestrian may push or pull. For example dolleys, wheel barrows, garbage-bins with wheels, or shopping carts. Typically not designed to carry humans.
23	movable_object.debris	Debris or movable object that is too large to be driven over safely. Includes misc. things like trash bags, temporary road-signs, objects around construction zones, and trash cans.
24	vehicle.train	Vehicle travelling on railway, e.g. trains and trams.
25	static_object.traffic_sign	Traffic signs, with the pole for the traffic sign also within the 3D cuboid. For overhanging size, a horizontal cuboid will be used for the whole section.
26	vehicle.other	Misc class for vehicles. If not sure which class the vehile belongs other vehicle will be used. Also used for all vehicles that dont belong to any other class.
27	vehicle.ego_trailer	Represents the trailer for the ego vehicle.

5.3.3 Attribute Definition

Attribute no.	Attribute Group	Possible Value	Attribute Name	Definition
1	vehicle_activity	parked	vehicle.parked	Vehicle is stationary (usually for longer duration) with no immediate intent to move.
		stopped	vehicle.stopped	Vehicle, with a driver/rider in/on it, is currently stationary but has an intent to move.
		moving	vehicle.moving	Vehicle is moving.
2	has_rider	yes	cycle.with_rider	There is a rider on the bicycle or motorcycle.
		no	cycle.without_rider	There is NO rider on the bicycle or motorcycle.
3	human_activity	sitting_or_lying_down	pedestrian.sitting_lying_down	The human is sitting or lying down.
		standing	pedestrian.standing	The human is standing.
		moving	pedestrian.moving	The human is moving.
4	visibility	0%-40%	"1"	The object is 0% to 40% visible in panoramic view of all cameras.
		41%-60%	"2"	The object is 41% to 60% visible in panoramic view of all cameras.
		61%-80%	"3"	The object is 61% to 80% visible in panoramic view of all cameras.
		81%-100%	"4"	The object is 81% to 100% visible in panoramic view of all cameras.
5	traffic_sign_state	pole_mounted	traffic_sign.pole_mounted	When the traffic sign is mounted on a pole, typically next to, or on the road.
		overhanging	traffic_sign.pole_overhanging	with the ground plane.
		temporary	traffic_sign.temporary	When the sign is temporaryly placed there, typically around contructions areas, marking constructions or temporary

5.3.4 Attribute Mapping

Category	vehicle_activity	has_rider	human_activity	visibility	traffic_sign_state
vehicle.car	x			x	
vehicle.truck	x			x	
vehicle.bus.bendy	x			x	
vehicle.bus.rigid	x			x	
vehicle.construction	x			x	
vehicle.motorcycle		x		x	
static_object.bicycle_rack				x	
vehicle.bicycle		x		x	
vehicle.trailer	x			x	
vehicle.emergency.police	x			x	
vehicle.emergency.ambulance	x			x	
human.pedestrian.adult			x	x	
human.pedestrian.child			x	x	
human.pedestrian.construction_worker			x	x	
human.pedestrian.stroller				x	
human.pedestrian.wheelchair				x	
human.pedestrian.personal_mobility		x		x	
human.pedestrian.police_officer			x	x	
animal			x	x	
movable_object.trafficcone				x	
movable_object.barrier				x	
movable_object.pushable_pullable				x	
movable_object.debris				x	
vehicle.train				x	
static_object.traffic_sign				x	x
vehicle.other	x			x	
vehicle.ego_trailer	x			x	