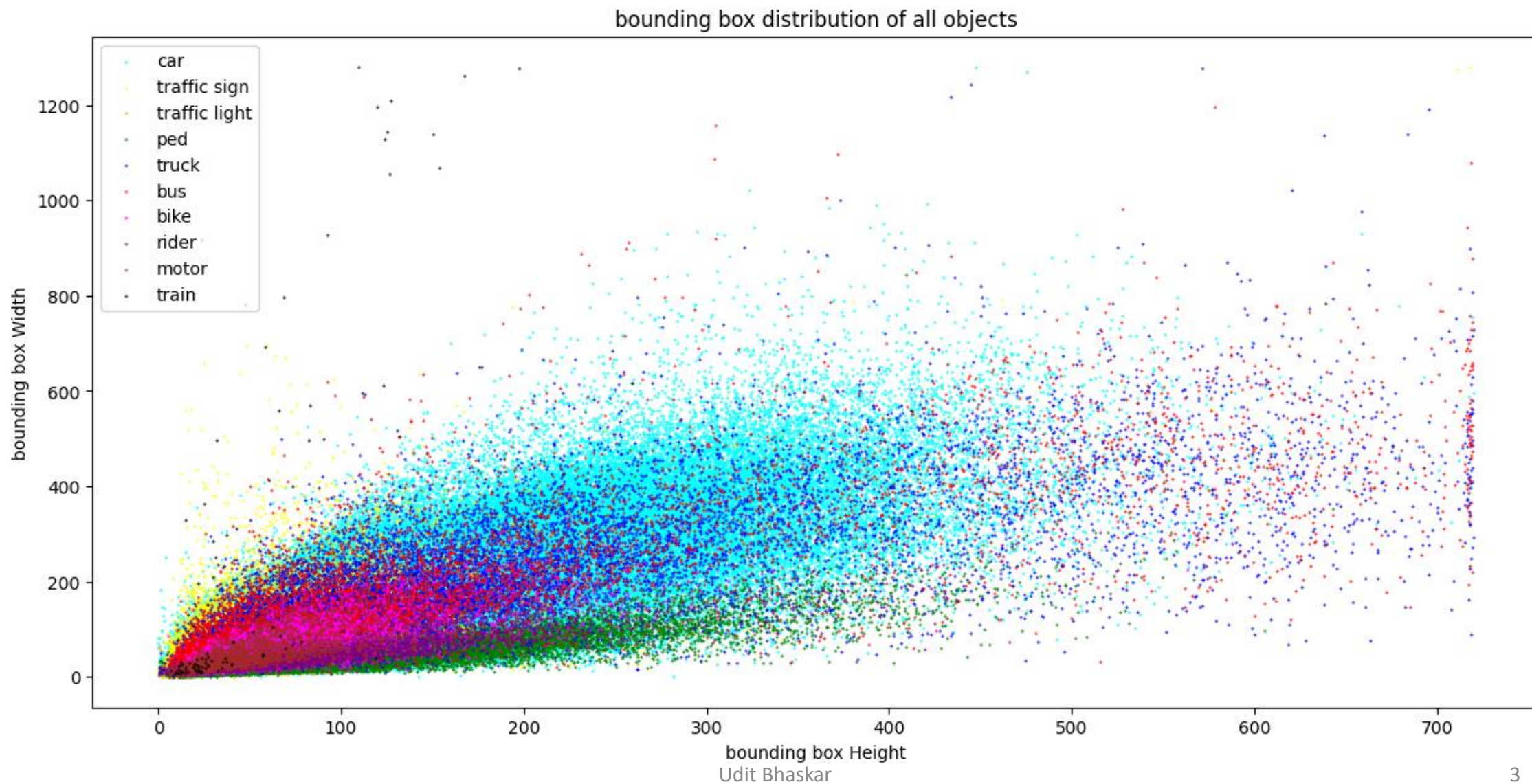# Detecting and Removing Annotation Errors & Remapping Ground Truth Class Labels

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BDD Dataset Bounding Box Scatterplot for all annotations

bounding box distribution of all objects

Visualizing Incorrect Annotations & Annotations Selection Thresholds

Based on the scatter plot in the previous slide, the invalid annotations as shown in the images on the right are removed **if any** of the follows conditions are not satisfied:

1) Box width lower threshold :
$$T_w = 5 \; pixels$$

2) Box height lower threshold :
$$T_h = 5 \; pixels$$

3) Box aspect ratio lower bound:
$$T_r^{low} = 0.1$$

4) Box aspect ratio upper bound:
$$T_r^{high} = 10$$

BOX AREA TOO SMALL

../../../../dataset/bdd/bdd100k_images_100k/bdd100k/images/100k/train\20a773e1-a9268e6b.jp

```
box aspect ratio : 13.99865436553955
box area         : 0.871501624584198
box width        : 3.492828369140625
box height       : 0.24951171875
box class        : car
```

../../../../dataset/bdd/bdd100k_images_100k/bdd100k/images/100k/train\7bc6abdd-6a5c7b75.jpg

```
box aspect ratio : 0.10000498592853546
box area         : 0.9366853833198547
box width        : 0.306060791015625
box height       : 3.060455322265625
box class        : traffic light
```

INCORRECT CLASS LABELS

../../../../dataset/bdd/bdd100k_images_100k/bdd100k/images/100k/train\092564ae-43ba2b4b.jp

```
box aspect ratio : 2.669745922088623
box area         : 603797.8125
box width        : 1269.640380859375
box height       : 475.5660095214844
box class        : car
```

../../../../dataset/bdd/bdd100k_images_100k/bdd100k/images/100k/train\2e5a3ced-c7603d0d.jpg

```
box aspect ratio : 1.7912280559539795
box area         : 906063.4375
box width        : 1273.9569091796875
box height       : 711.2198486328125
box class        : traffic sign
```

EXTREME ASPECT RATIO

../../../../dataset/bdd/bdd100k_images_100k/bdd100k/images/100k/train\60c972aa-6bc6464f.jp

```
box aspect ratio : 0.02777762897312641
box area         : 759.1505126953125
box width        : 4.59210205078125
box height       : 165.31655883789062
box class        : car
```

../../../../dataset/bdd/bdd100k_images_100k/bdd100k/images/100k/train\a74c2fb0-facb7d1f.jpg

```
box aspect ratio : 63.000396728515625
box area         : 1003.8577880859375
box width        : 251.48248291015625
box height       : 3.99176025390625
box class        : car
```

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Ground Truth Class Label Remap

object category label distribution

BDD Original Labels

object category label distribution

BDD Remapped Labels
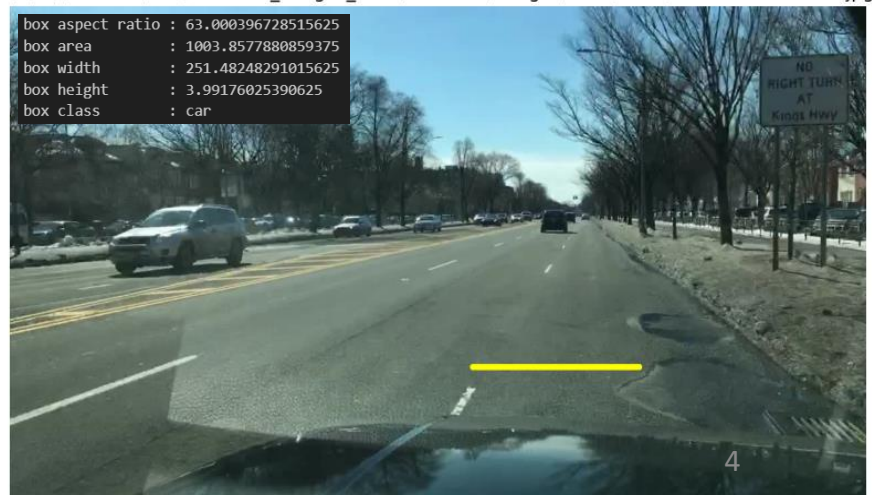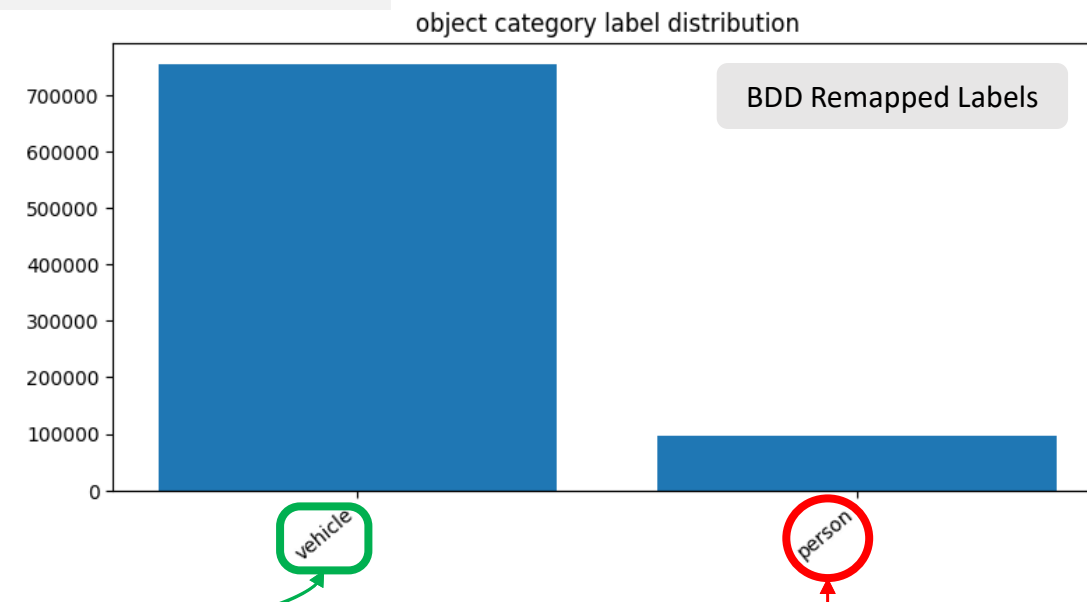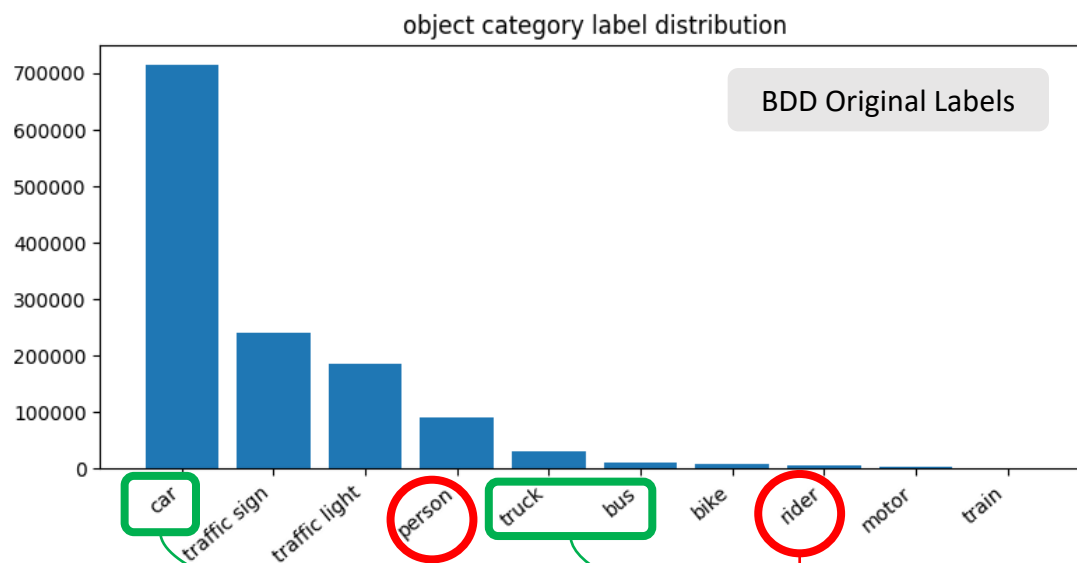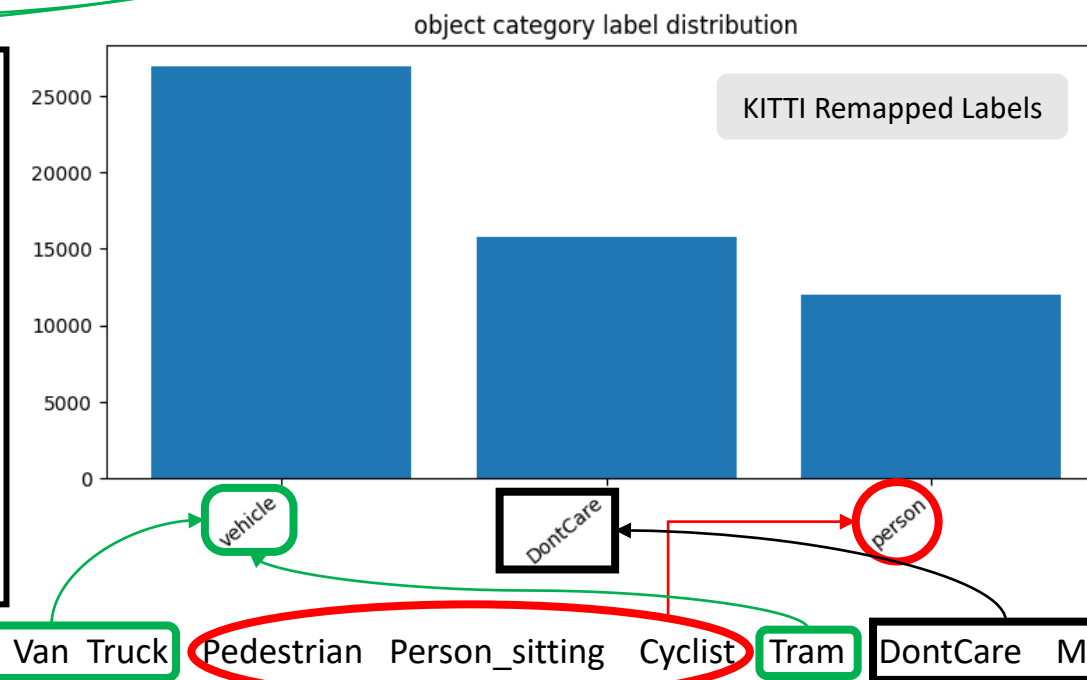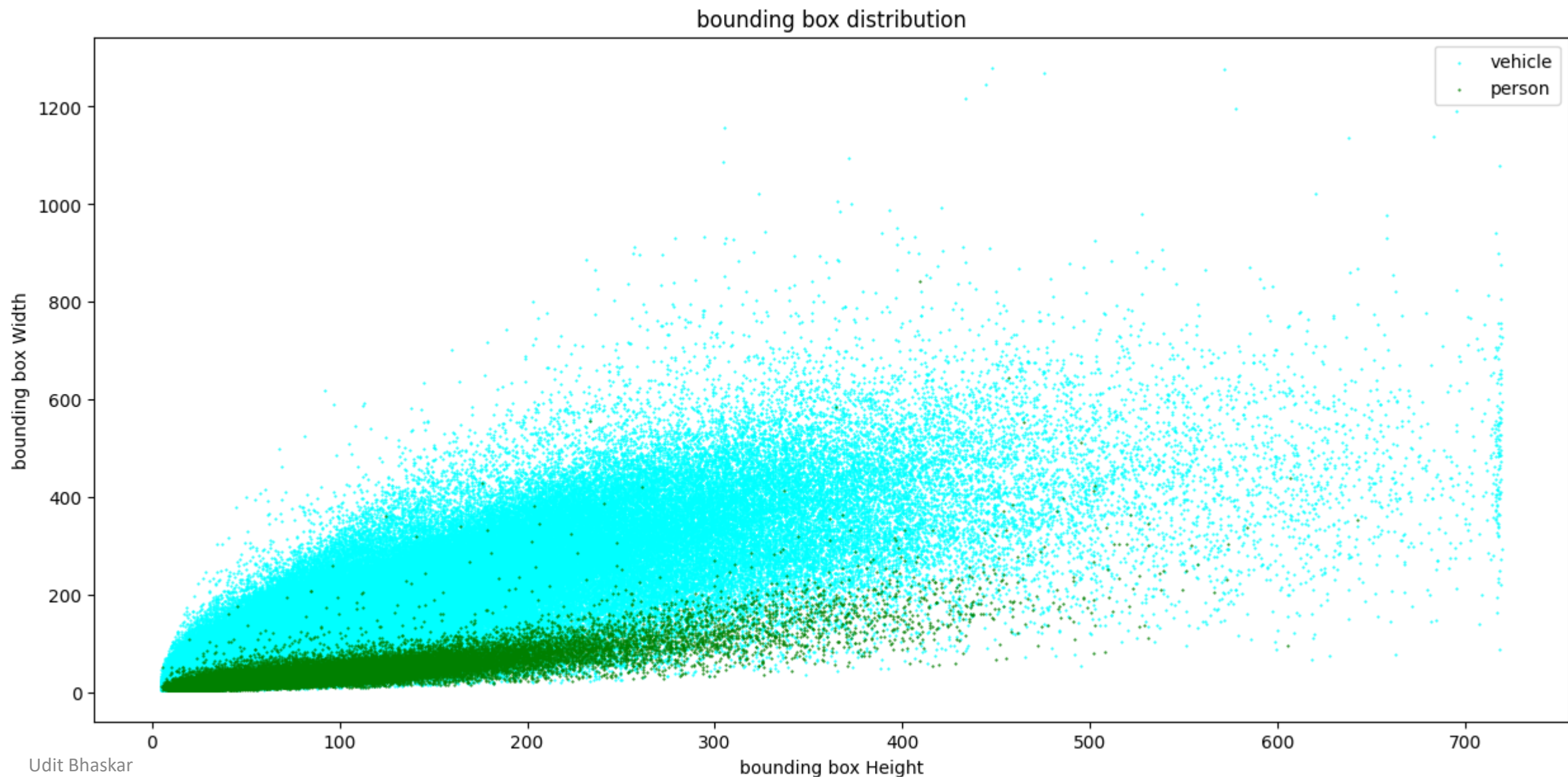
Some of **training labels** are **merged** and the rest are **ignored** due to the following reasons:

1. **Simplying** the first version of the object detector.

2. **Wrong annotations** ('car', 'truck', 'bus' labels are often incorrect)

3. Very **few instances** of a particular type of object (e.g. very few instances of type 'bike' and 'motor')

4. **Irrelevant** object types (e.g. 'train', 'DontCare')

object category label distribution

KITTI Remapped Labels

Car Van Truck   Pedestrian   Person_sitting   Cyclist Tram   DontCare   Misc

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BDD Dataset Bounding Box Scatterplot for selected annotations

bounding box distribution

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KITTI Dataset Bounding Box Scatterplot for selected annotations

bounding box distribution