

# COCO 2017 Detection Analysis

07:19 July 09, 2023

## 1. Image Features

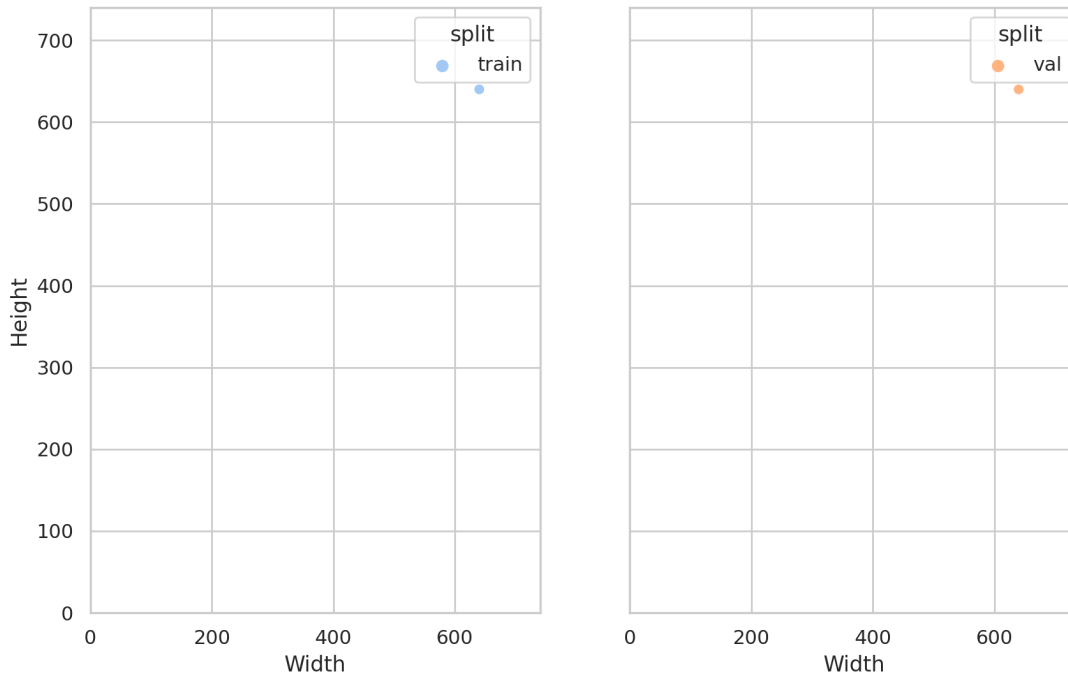
### 1.1. General Statistics

	Train	Validation
Images	15984	4952
Classes	80	80
Classes in use	80	80
Annotations	116088	36309
Annotations per images	7.26	7.33
Images with no annotations	0	0
Median image resolution	640x640	640x640
Smallest annotation	1	2
Largest annotation	409600	409600
Most annotations in an image	50	50
Least annotations in an image	1	1



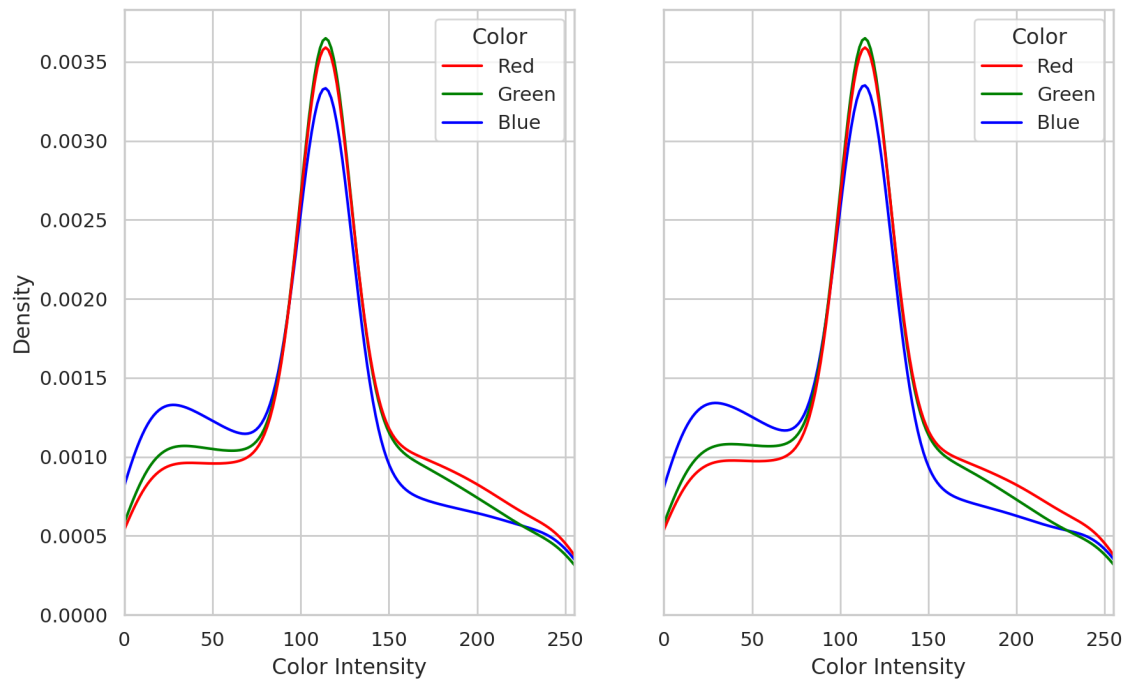
**Warning:** The results presented in this report cover only a subset of the data. Train set: 15984 out of 117264 samples were analyzed (13.6%). Validation set: 4952 out of 4992 samples were analyzed (99.2%).

### 1.2. Image Width and Height Distribution



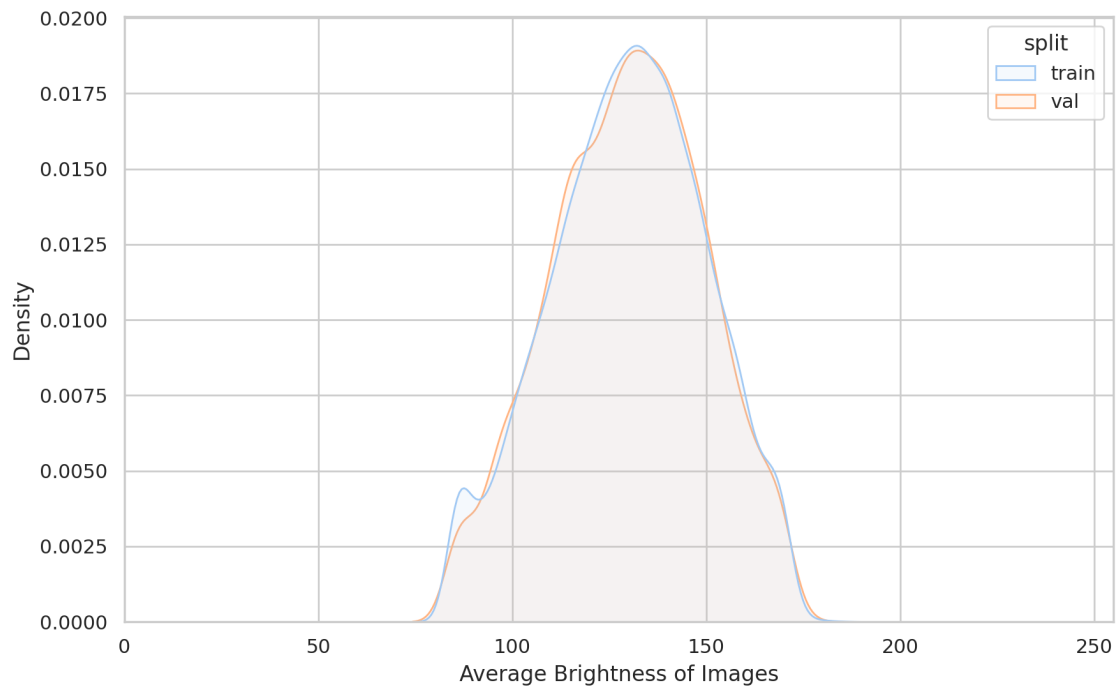
These histograms depict the distributions of image height and width. It's important to note that if certain images have been rescaled or padded, the histograms will represent the size after these operations.

### 1.3. Color Distribution



Here's a comparison of RGB or grayscale intensity (0-255) distributions across the entire dataset, assuming RGB channel ordering. It can reveal discrepancies in the image characteristics between the two datasets, as well as potential flaws in the augmentation process. E.g., a notable difference in the mean value of a specific color between the two datasets may indicate an issue with the augmentation process.

## 1.4. Image Brightness Distribution

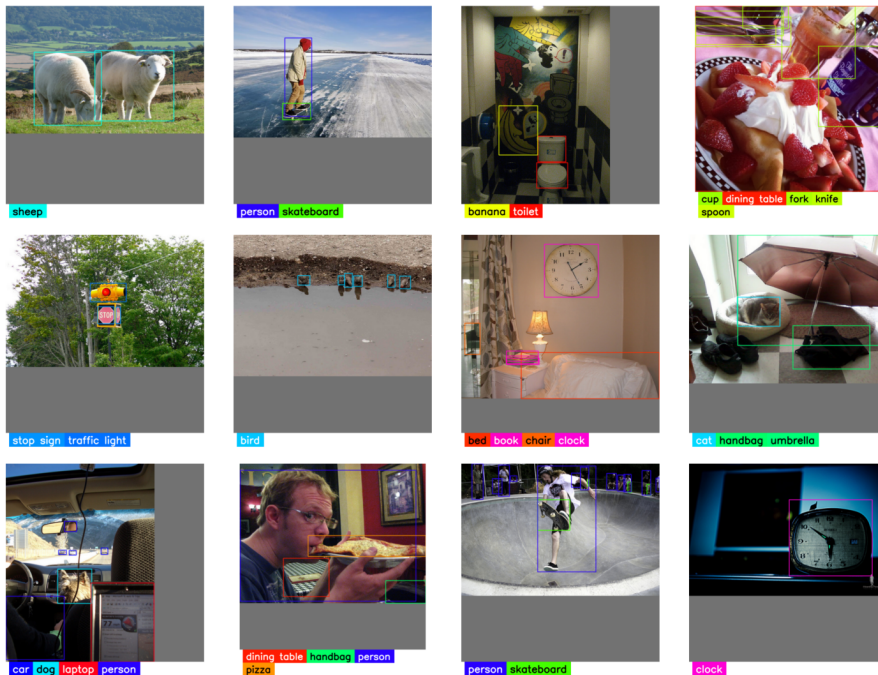


This graph shows the distribution of the of the brightness levels across all images. It may uncover differences between the training and validation sets, such as the presence of exclusively daytime images in the training set and nighttime images in the validation set.

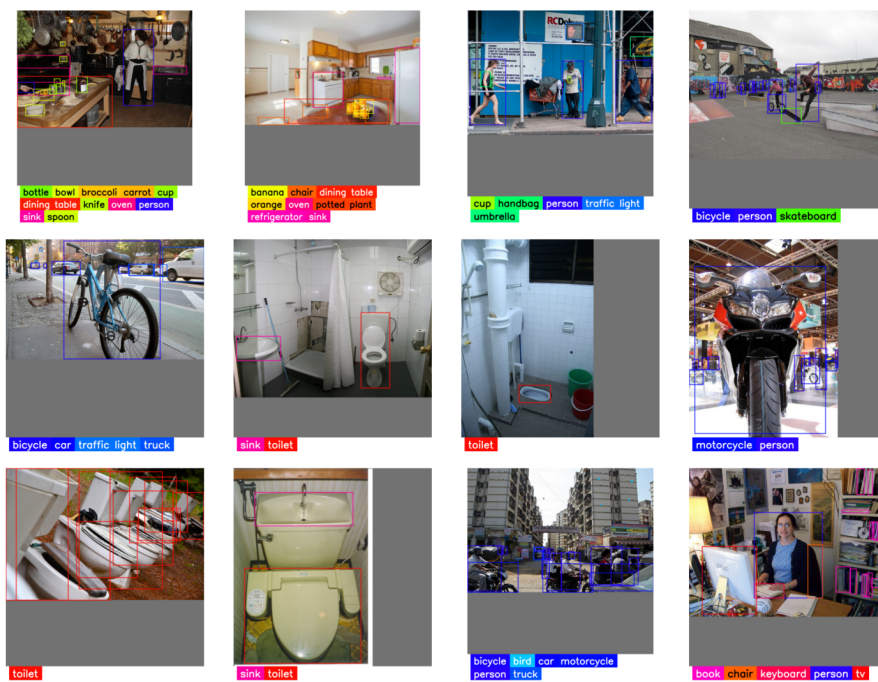
## 2. Object Detection Features

### 2.1. Visualization of Samples

train



val



The sample visualization feature provides a visual representation of images and labels. This visualization aids in understanding of the composition of the dataset.

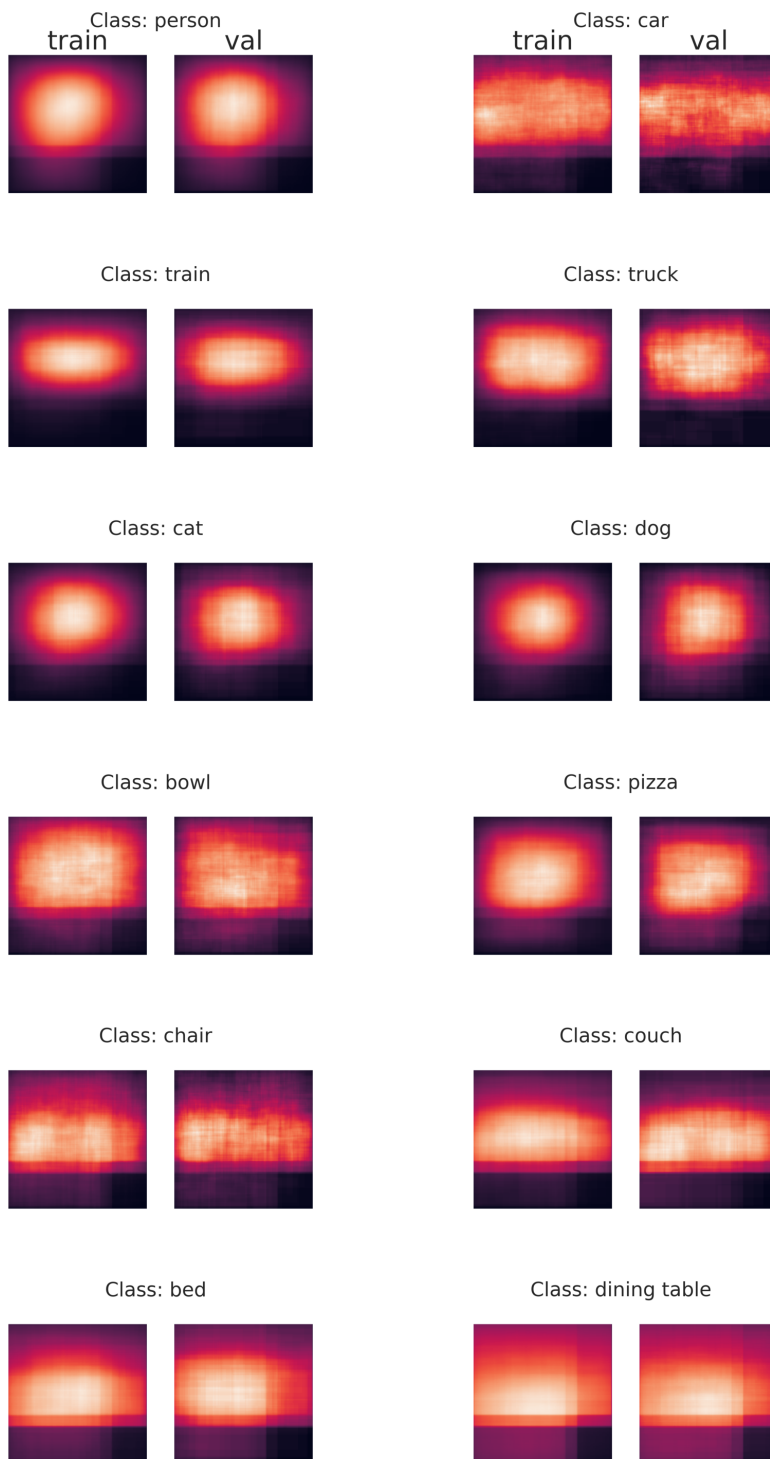


**Notice:** Only 12 random samples are shown.

You can increase the number of classes by changing ``n_cols`` and ``n_rows`` in the configuration file.



## 2.2. Bounding Boxes Density



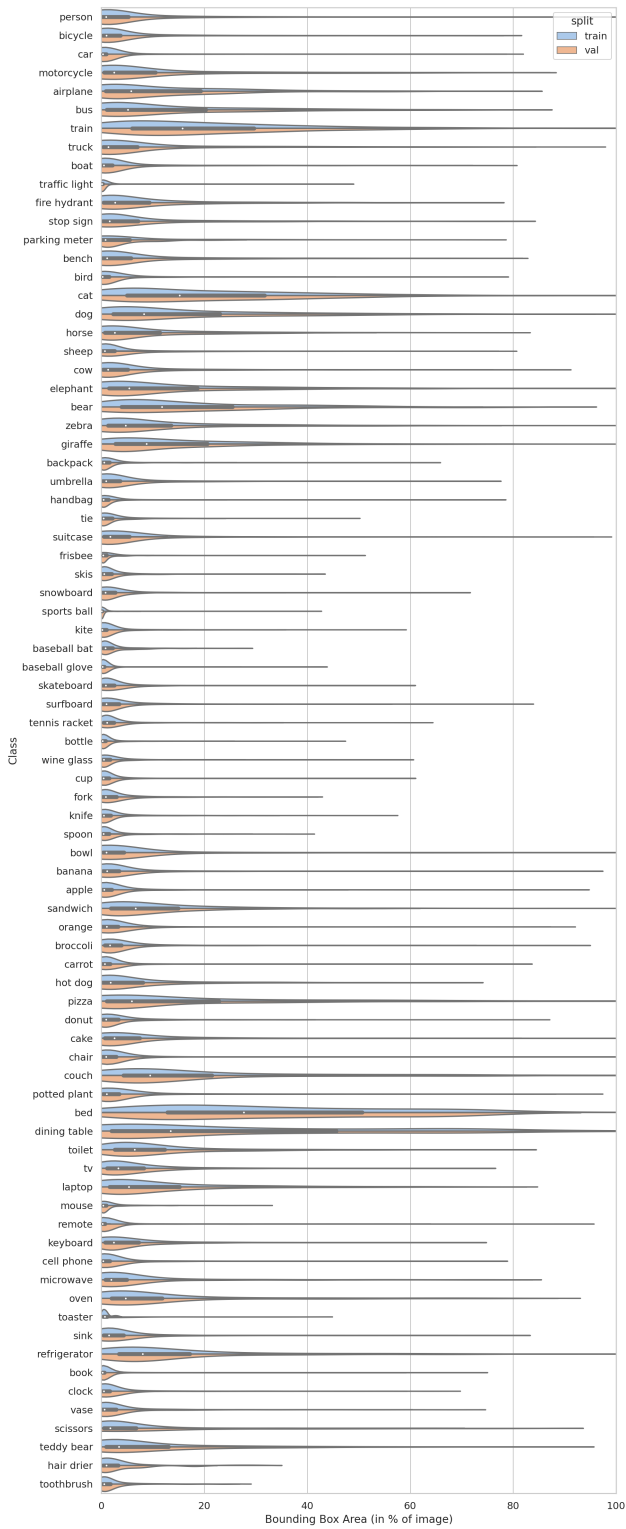
These heatmaps represent areas of high object density within the images, providing insights into the spatial distribution of objects. By examining the heatmaps, you can quickly detect whether objects are predominantly concentrated in specific regions or if they are evenly distributed throughout the scene. This information can serve as a heuristic to assess if the objects are positioned appropriately within the expected areas of interest.



**Notice:** Only the 12 classes with highest density are shown.

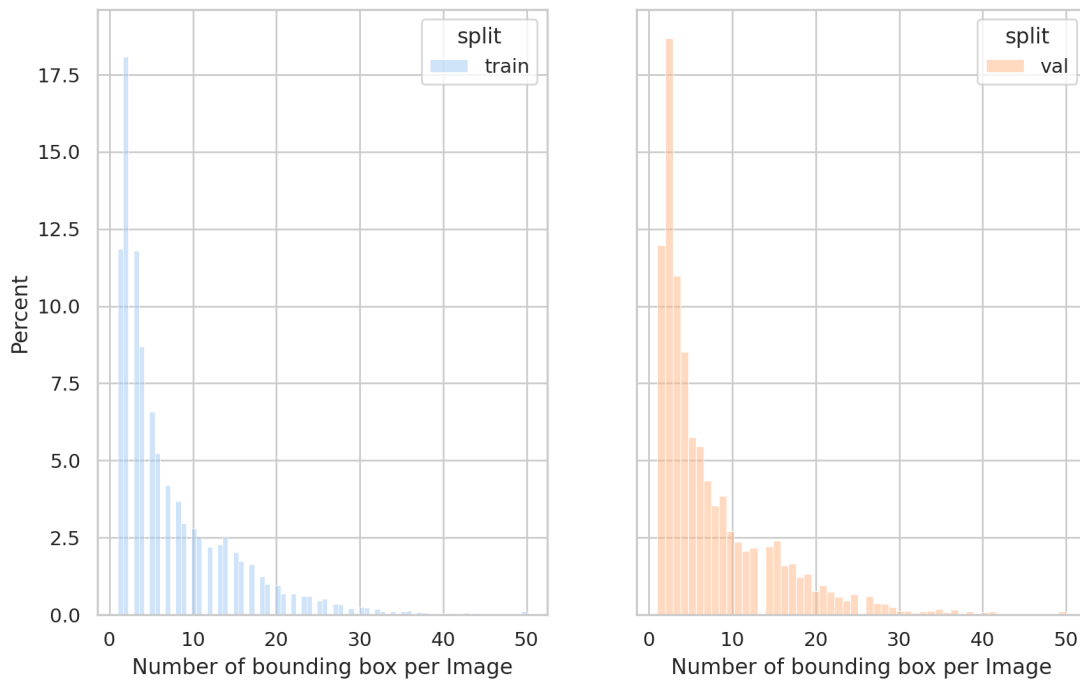
You can increase the number of classes by changing ``n_cols`` and ``n_rows`` in the configuration file.

### 2.3. Distribution of Bounding Box Area



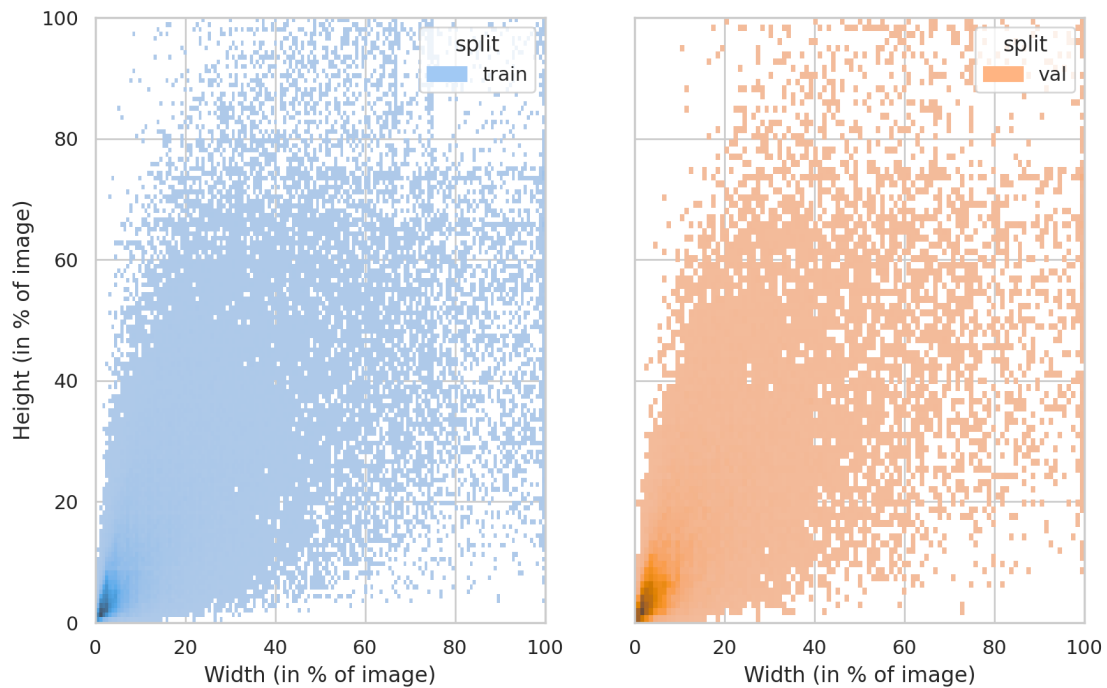
This graph shows the frequency of each class's appearance in the dataset. This can highlight distribution gaps in object size between the training and validation splits, which can harm the model's performance. Another thing to keep in mind is that having too many very small objects may indicate that you are downsizing your original image to a low resolution that is not appropriate for your objects.

## 2.4. Distribution of Bounding Box per Image



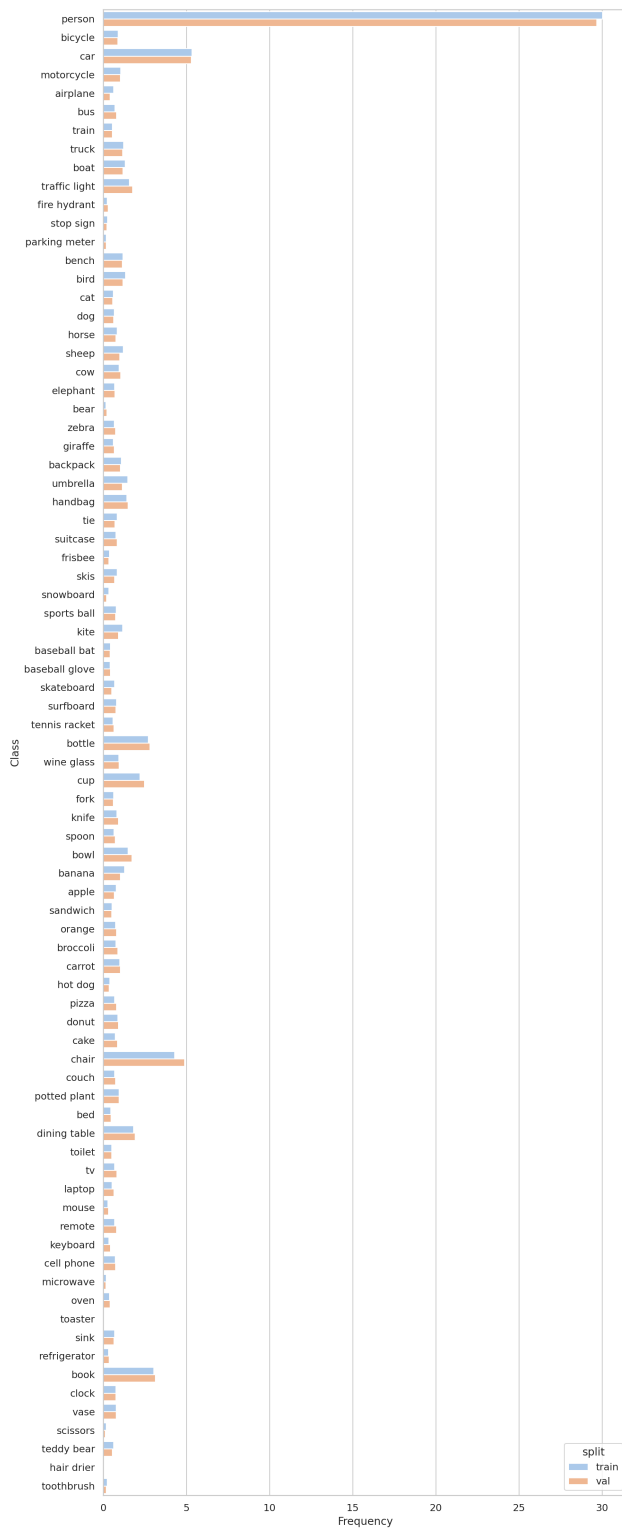
These graphs show how many bounding boxes appear in images. This can typically be valuable to know when you observe a very high number of bounding boxes per image, as some models include a parameter to filter the top k results.

## 2.5. Distribution of Bounding Box Width and Height



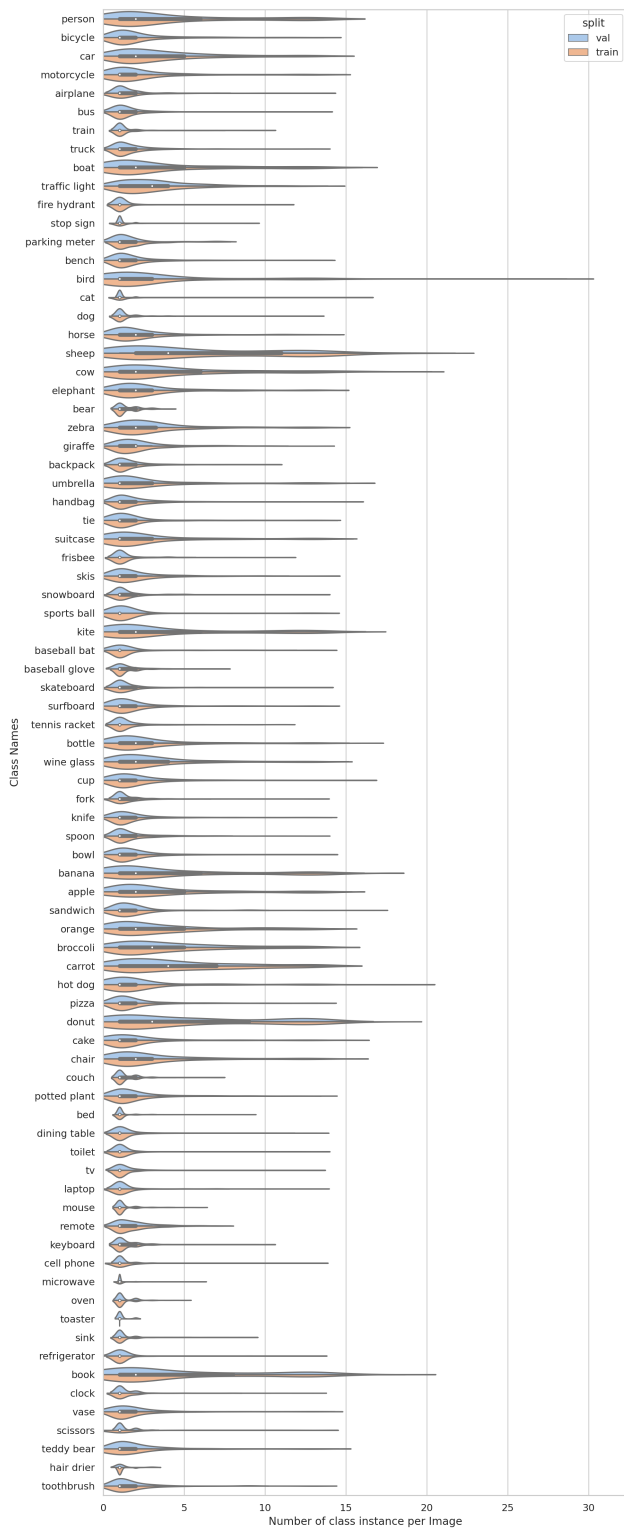
These heat maps illustrate the distribution of bounding box width and height per class. Large variations in object size can affect the model's ability to accurately recognize objects.

## 2.6. Class Frequency



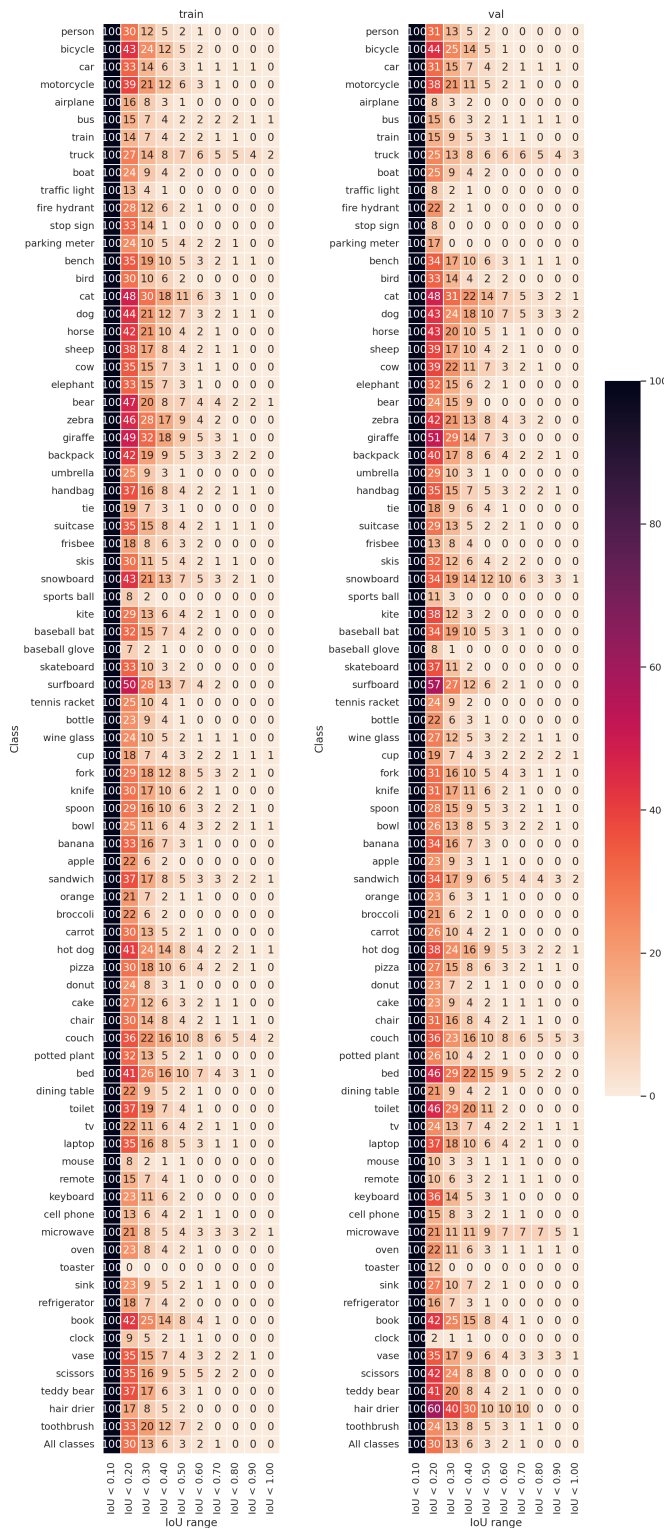
This bar plot shows the frequency of each class's appearance in the dataset. This may highlight class distribution gaps between the training and validation splits. For instance, if one of the classes only appears in the validation set, you know in advance that your model won't be able to learn to predict that class.

## 2.7. Distribution of Class Frequency per Image



This graph shows how many times each class appears in an image. It highlights whether each class has a constant number of appearances per image, or whether there is variability in the number of appearances from image to image.

## 2.8. Intersection of Bounding Boxes



The distribution of each box's Intersection over Union (IoU) with respect to other boxes in the sample. The heatmap shows the percentage of boxes that overlap with IoU in range [0..T] for each class. Intersection of all boxes is considered (regardless of classes of corresponding bounding boxes).

To better understand how to tackle the data challenges highlighted in this report, explore our comprehensive course on profiling computer vision datasets. [Click here.](#)