

OPENCV SEGMENTATION PROJECT

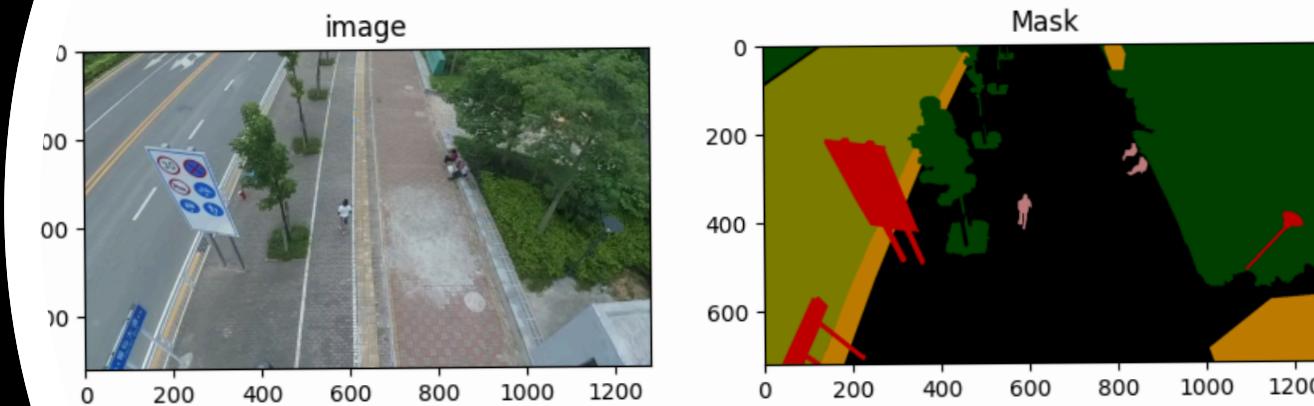
Dataset case study



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INTRODUCTION

This competition is about the segmentation of images taken from drones.
Evaluation metric is the Dice score.
The task is to predict the most accurate mask for each class, taking into account the limited amount of GPU resources you have.



WHAT IS SEGMENTATION?

Image segmentation is a computer vision problem where the image is divided into “segments”. Each pixel belongs to specific class. Helps in object detection, medical imaging, and autonomous vehicles.



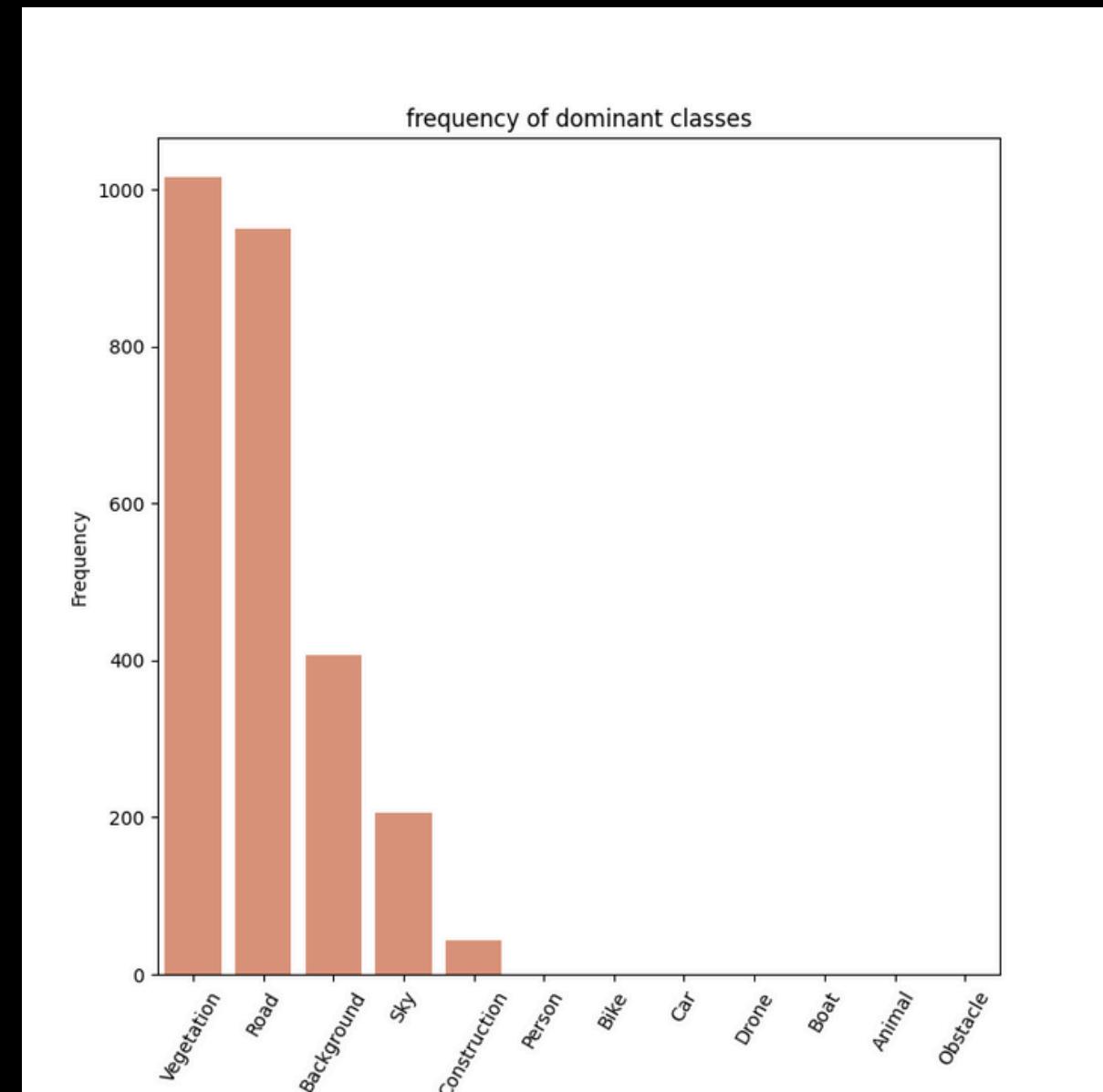
DATASET OVERVIEW

Dataset Metadata

The dataset is consisting of 2621 Images with size of 1280X720 and 1.78 aspect ratio. There are a 12 class including the background. The classes are: Background, Person, Bike, Car, Drone, Boat, Animal, Obstacle, Construction, Vegetation, Road, And Sky.

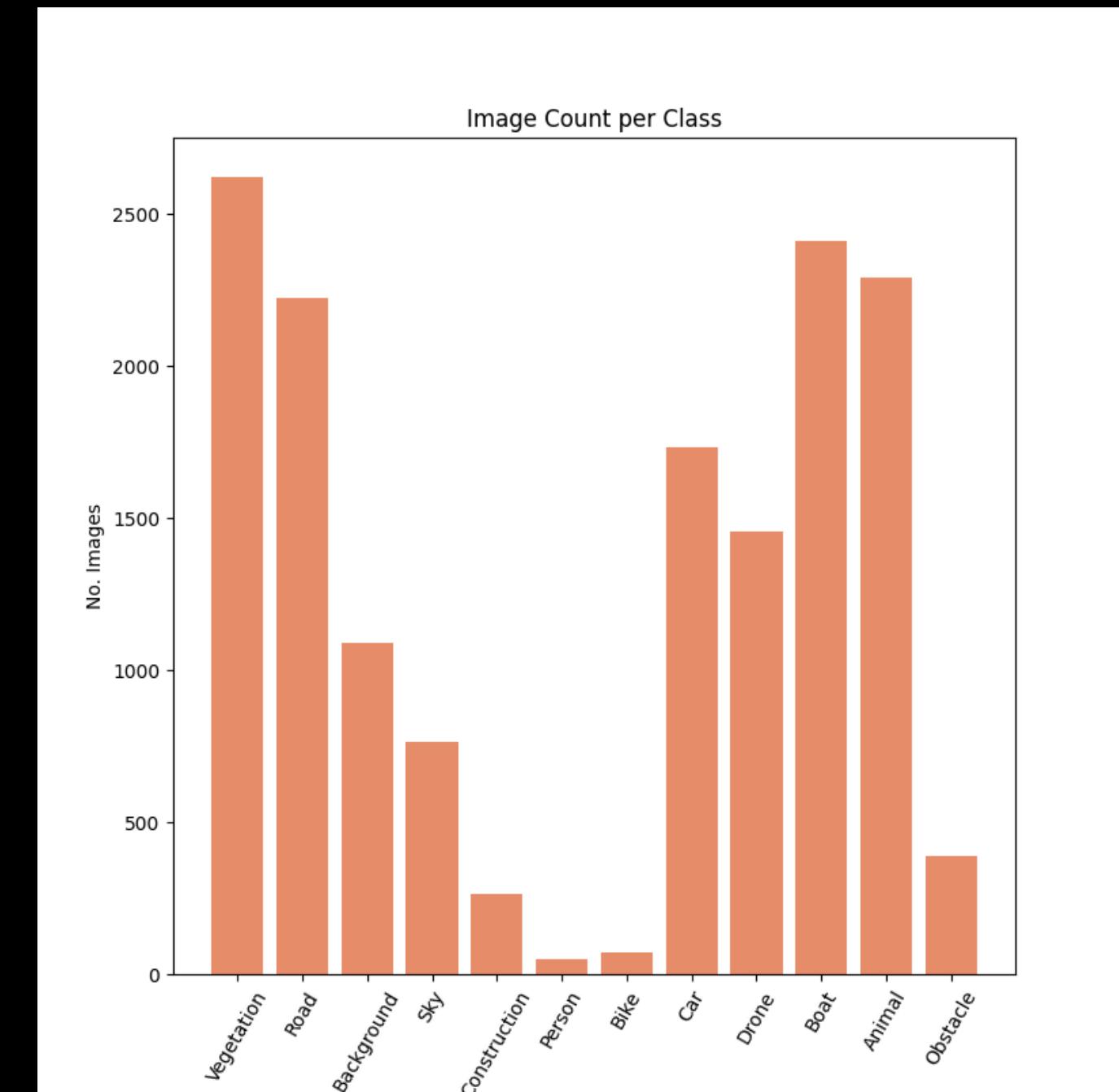
Most Dominant Classes

What we've found is that the most dominant classes are: Vegetation, Road, Background, And Sky. Which is normal since they are the most natural thing in any urban environment.



HOW MANY TIMES CLASS X OCCUR?

The following figure shows in how many image Class X occur. This is important since ML models could have bias towards specific class rather than others(Overfitting, environment bias). And this emphasize the importance of well defined data augmentation approach to make sure resonable result.



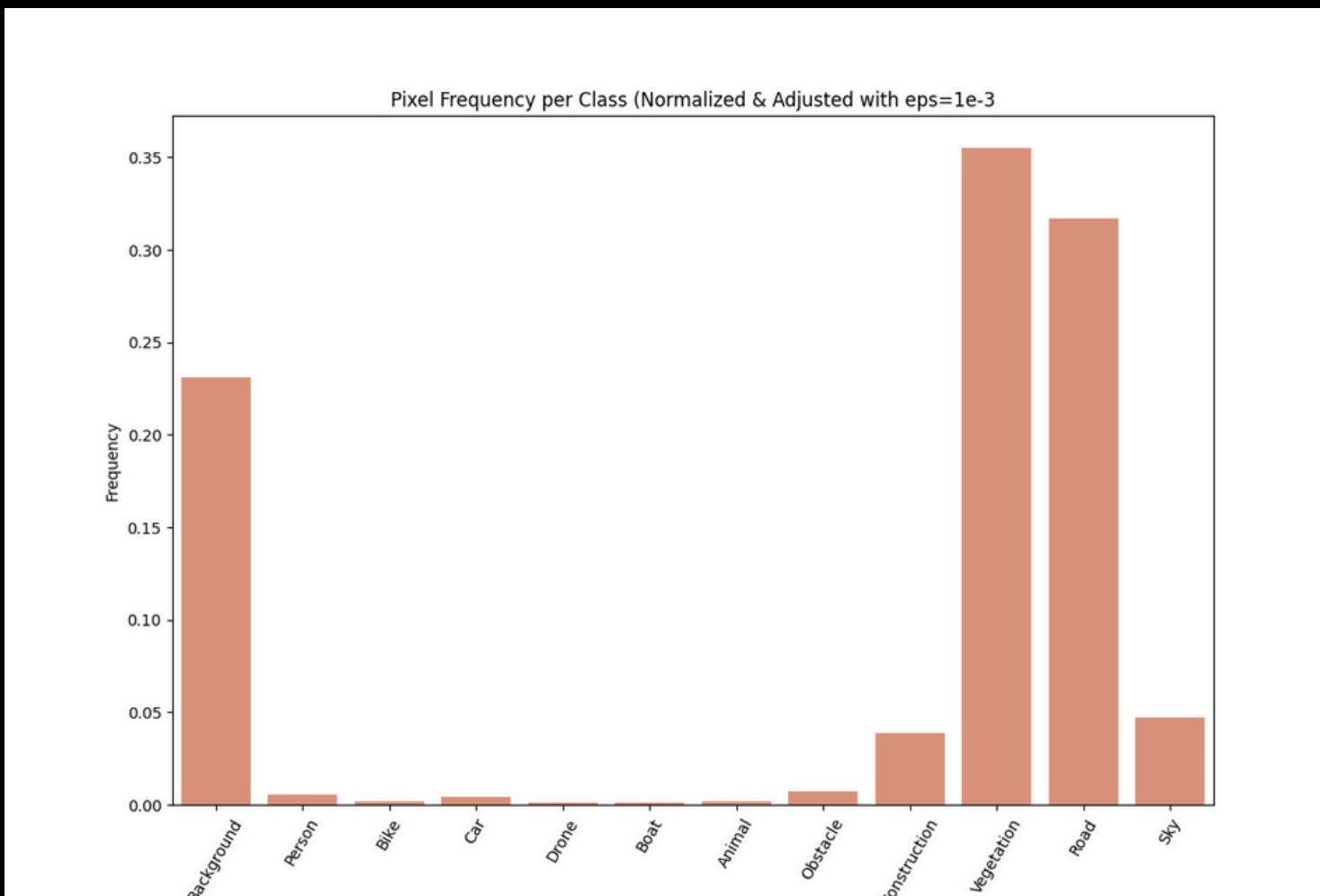
PROPORTION OF PIXELS

35%

Of pixels are Vegetation. The overall Distribution clearly shows data imbalance which is a highly challenge in segmentation problems.

● Solution

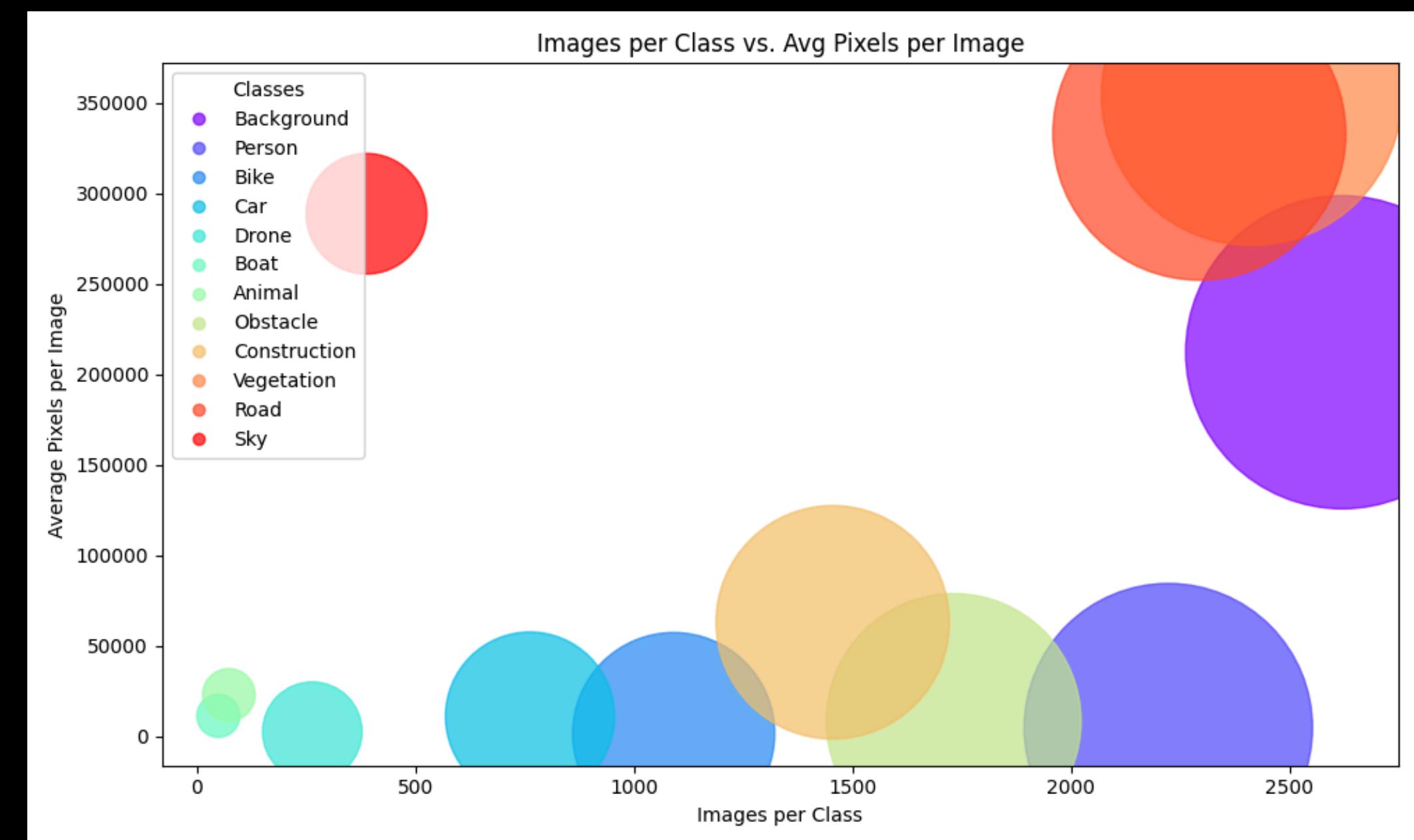
We gonna give the least occurring classes a higher weights so most frequent classes will have less importance while least classes will have high penalty in training.



AVG NO. PIXELS OF CLASS X

Dataset Metadata

The scatter plot shows the impact of each class across all images with how many pixels on avg.

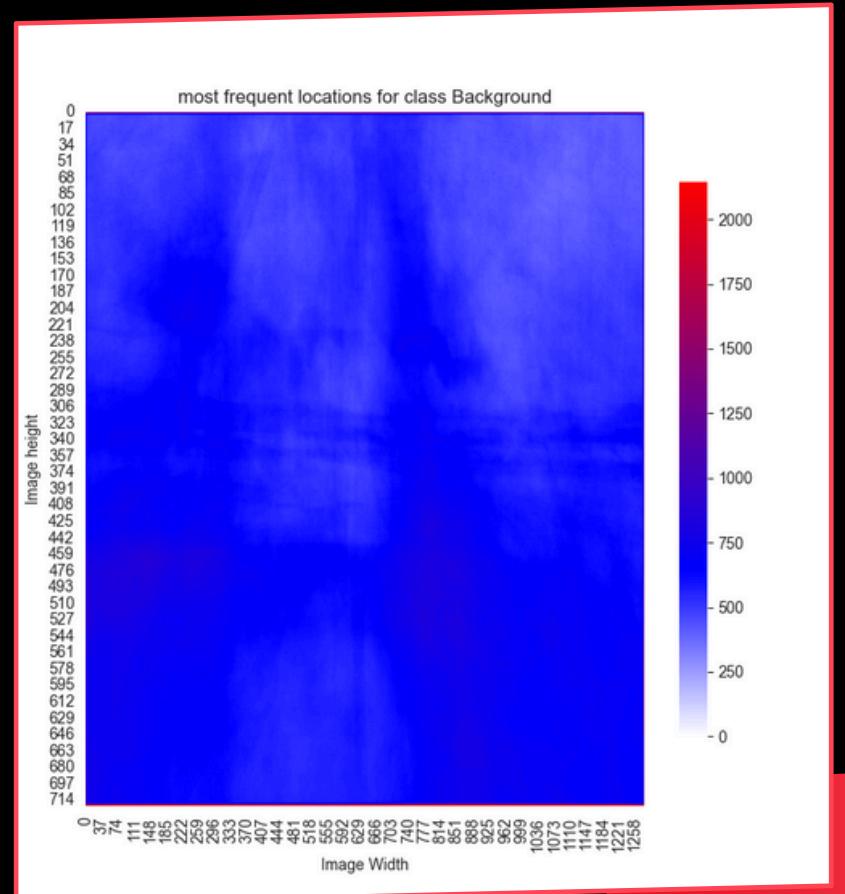
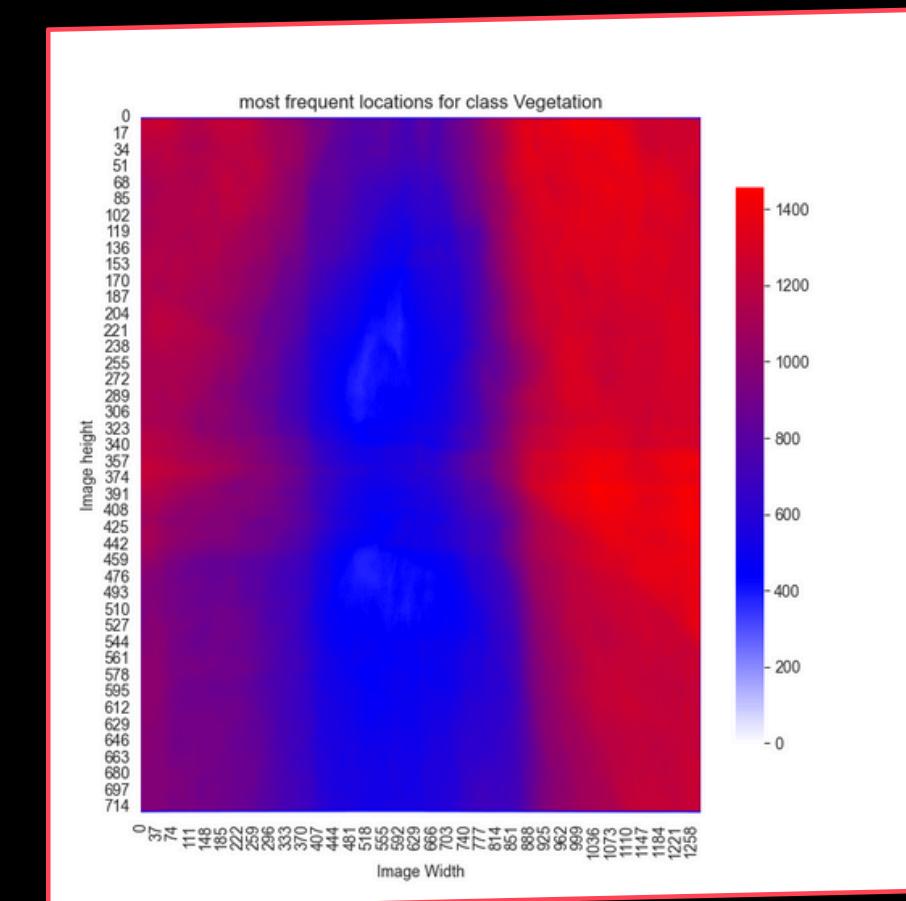
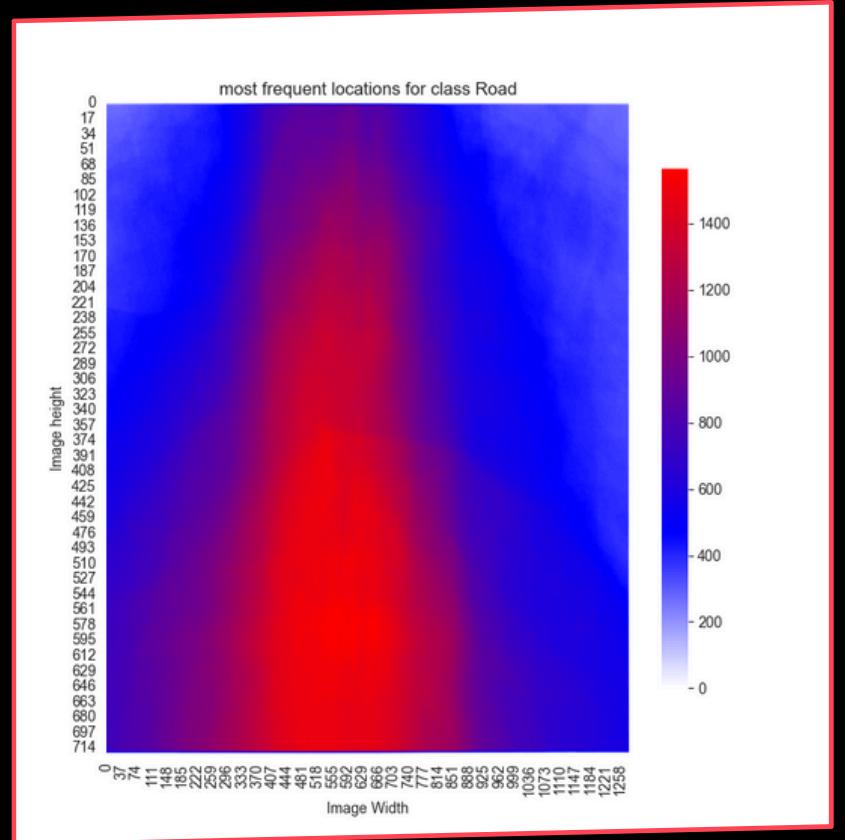
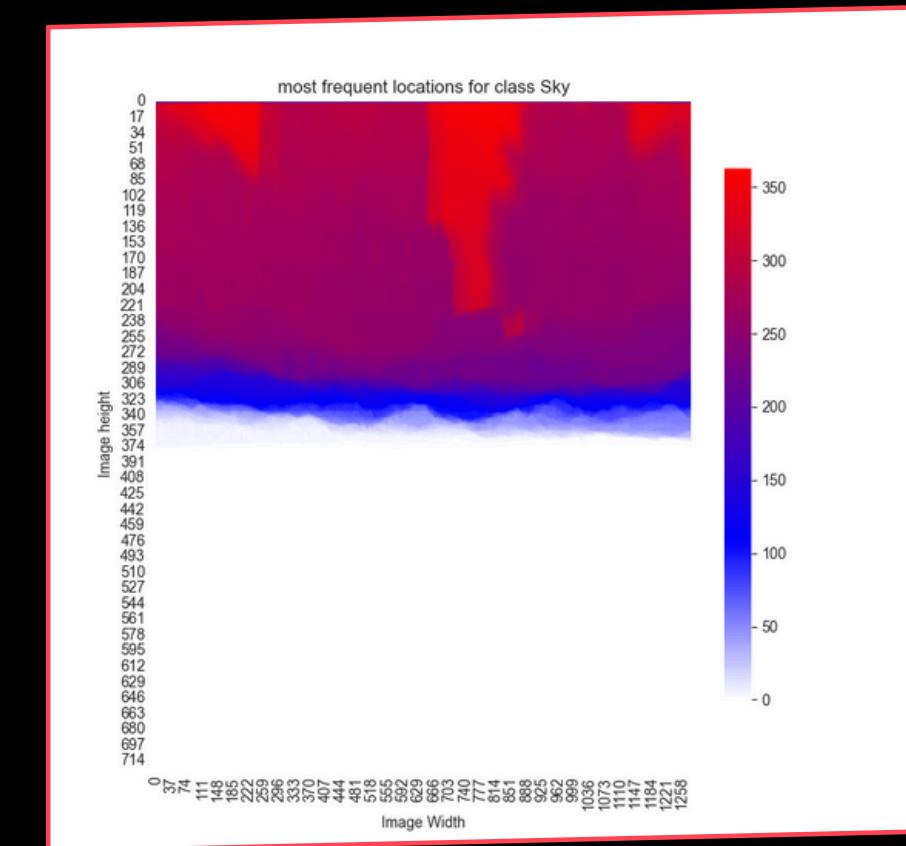


WHAT ARE THE MOST LOCATIONS HAVE CLASS X?

In this section, we are gonna check the most locations each class occurred in.

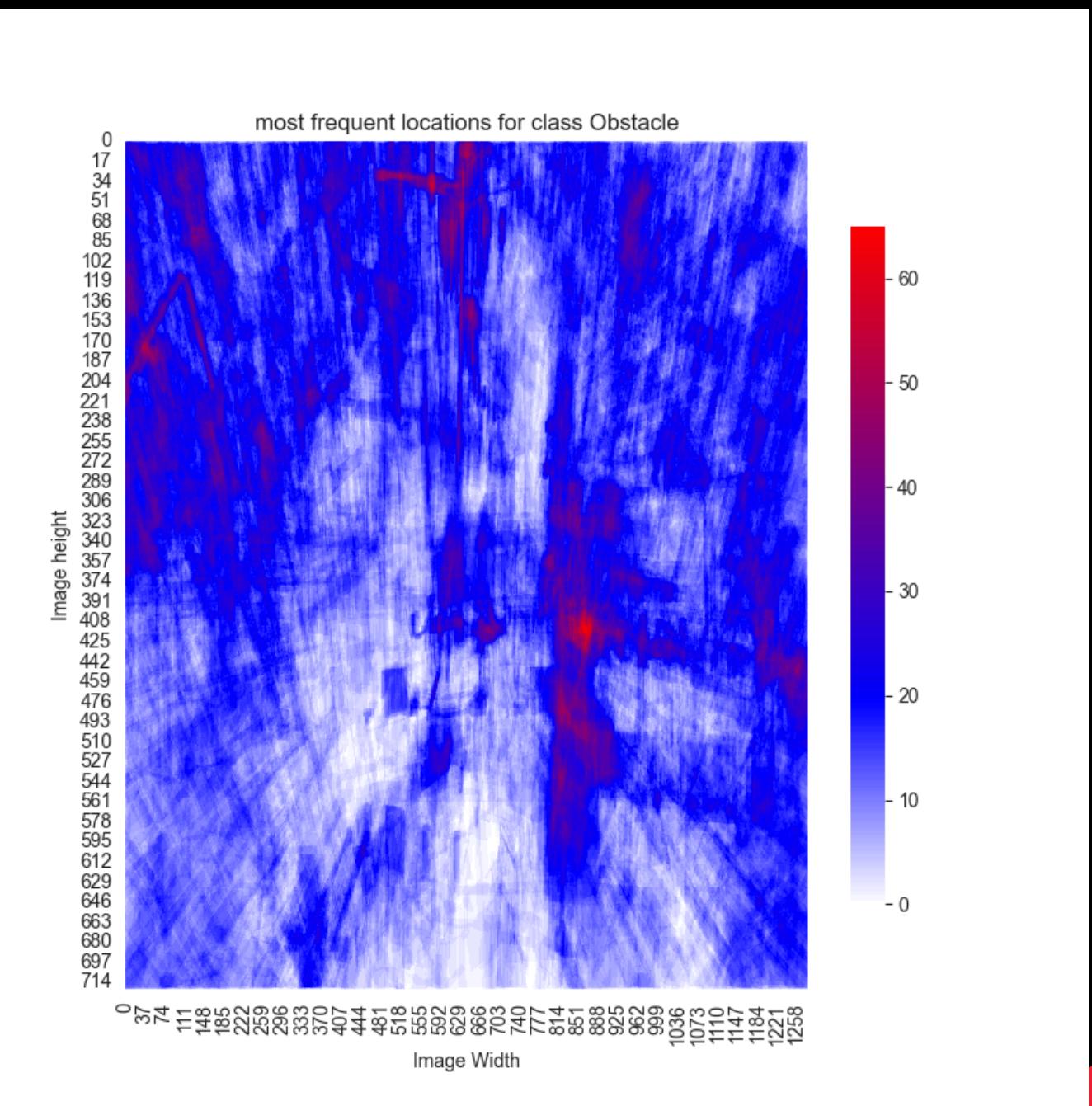
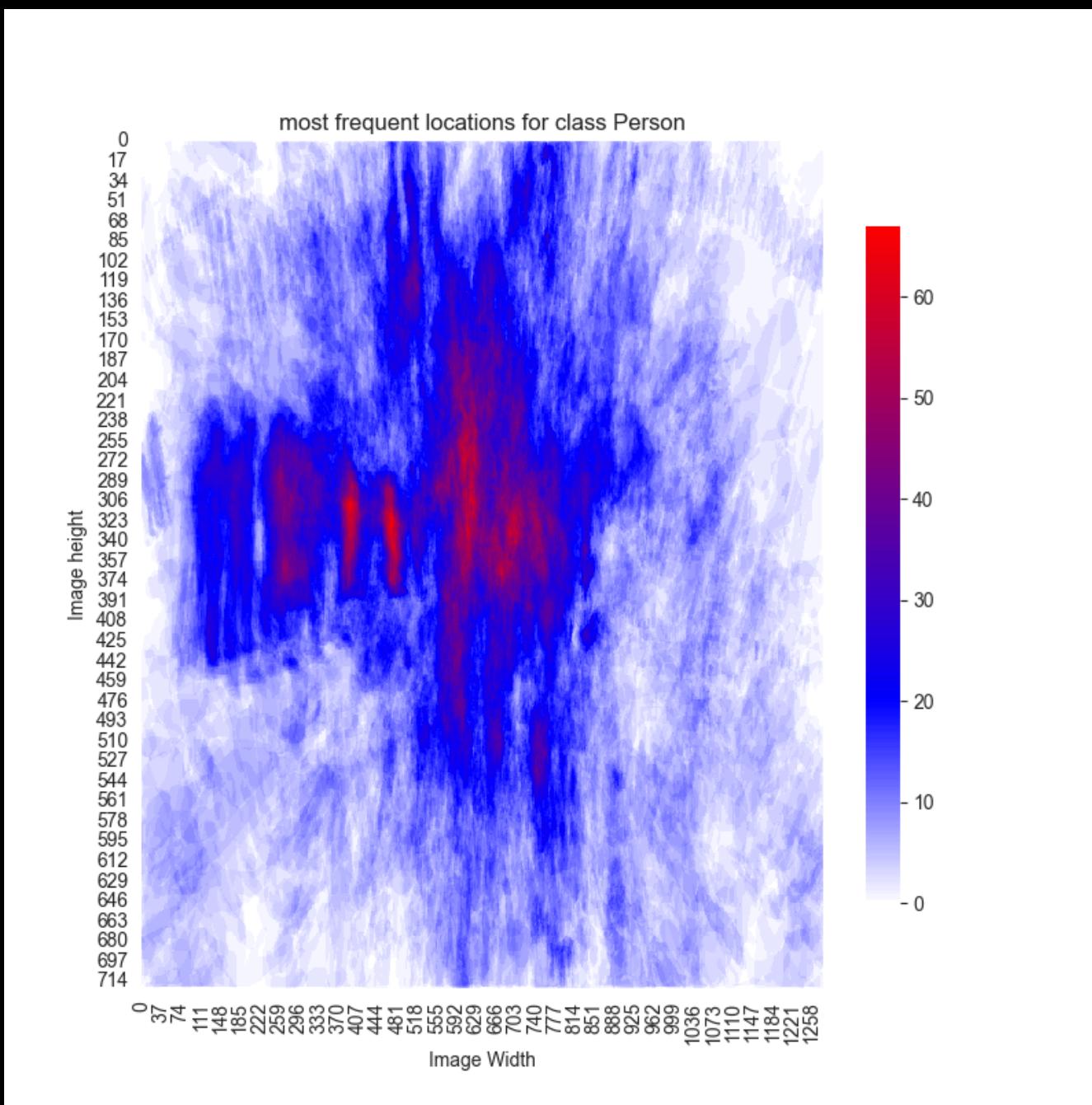
MOST DOMINANT CLASSES

- The figures shows the top-4 dominant classes, Vegetation, Sky, Background, And Road. Sky pixels in top of most images which is natural. for Road and Vegetation we could see how dense they are on middle, and sides respectively. Lastly, The background is totally across all images.

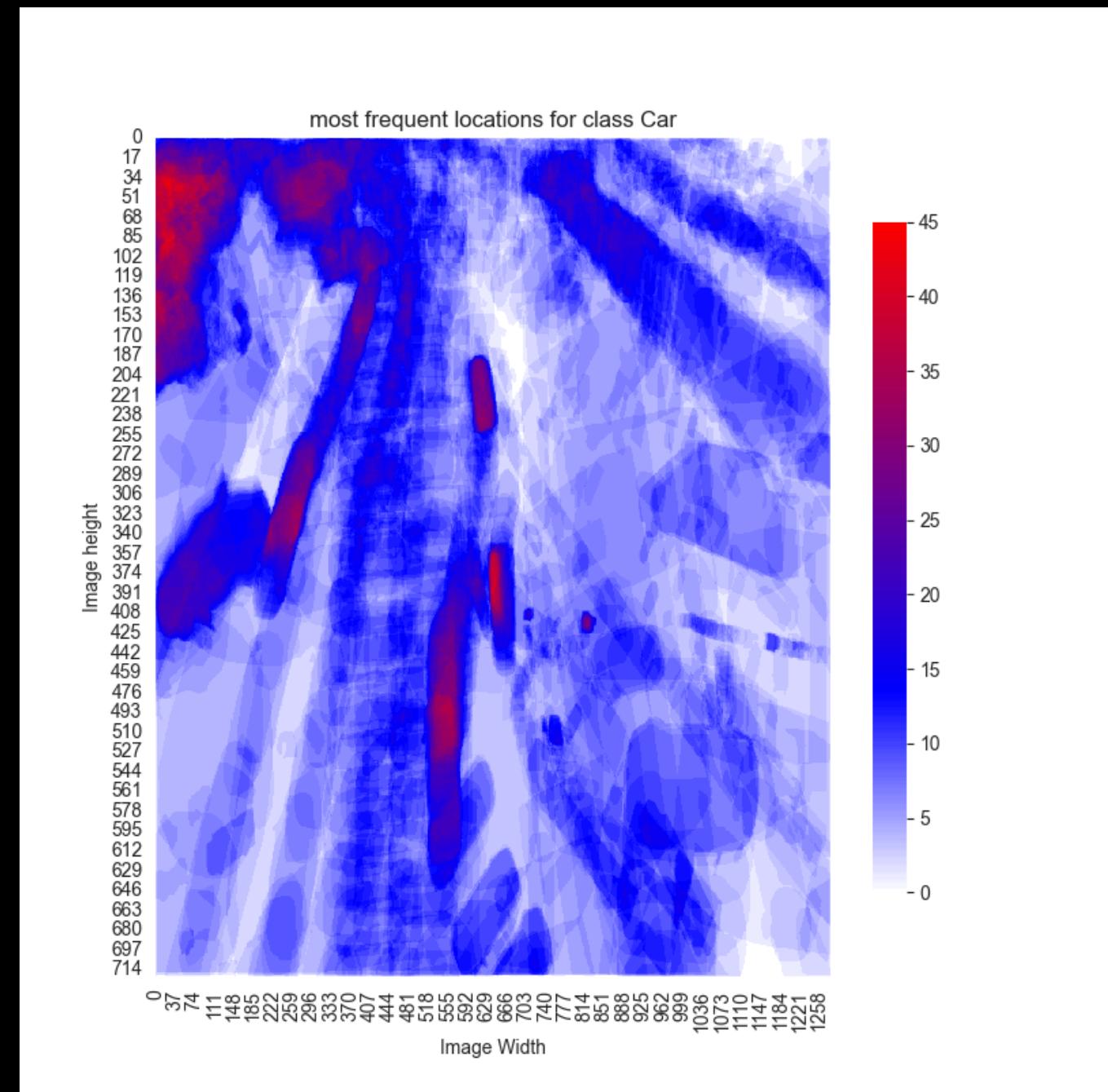
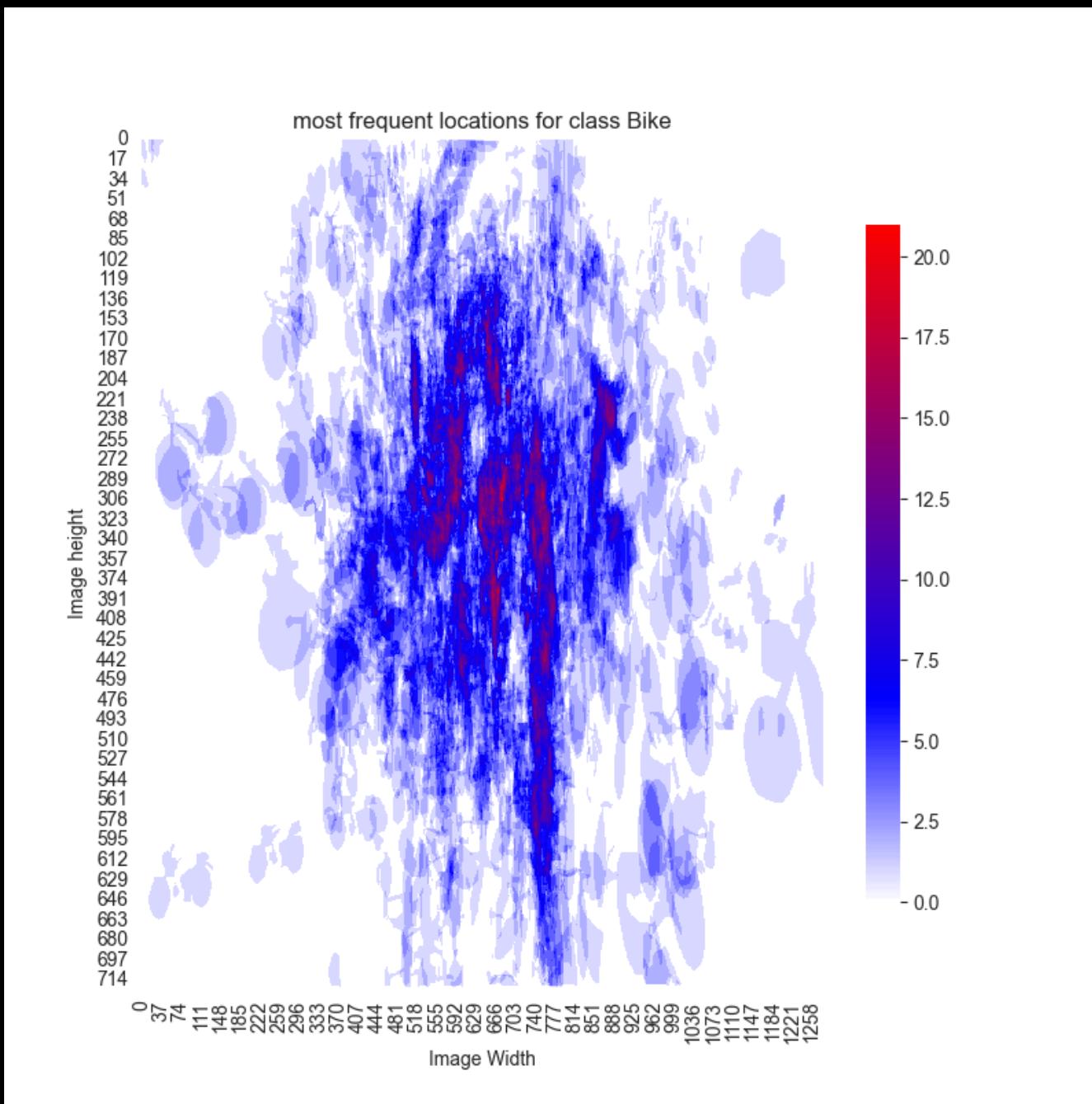


SUBMISSIVE CLASSES

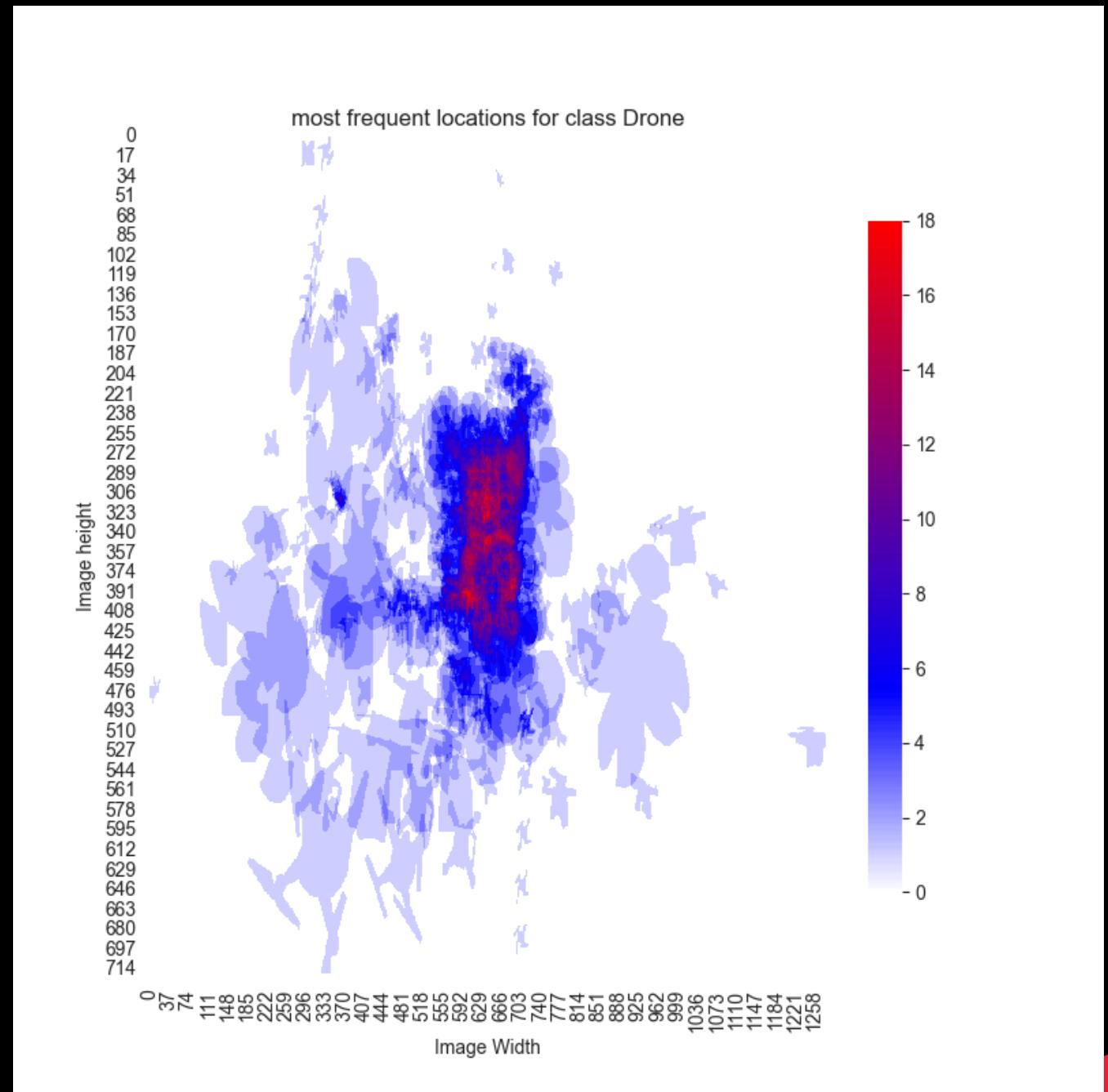
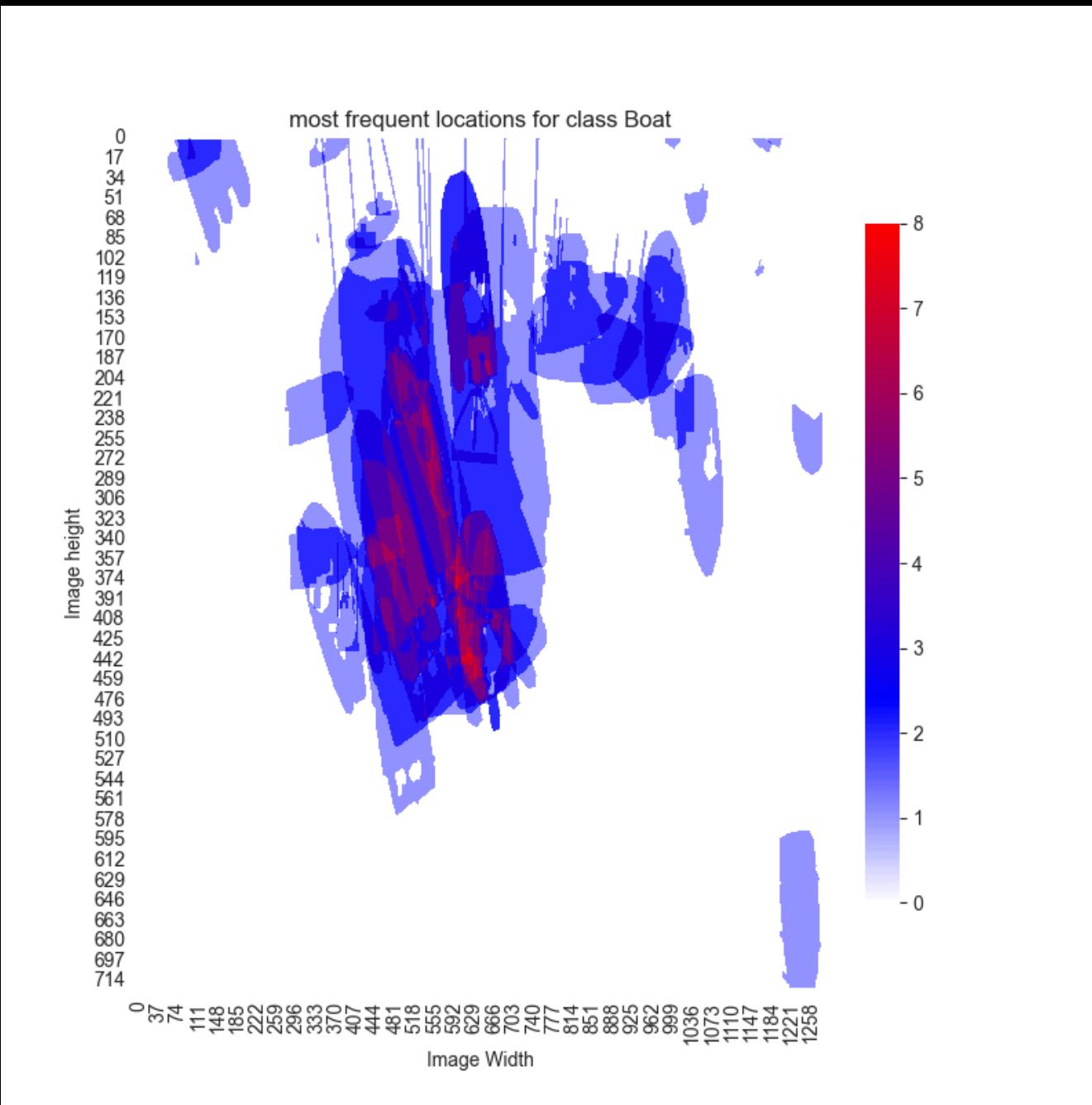
The
following
slides
shows the
least
classes and
how they
are
distributed



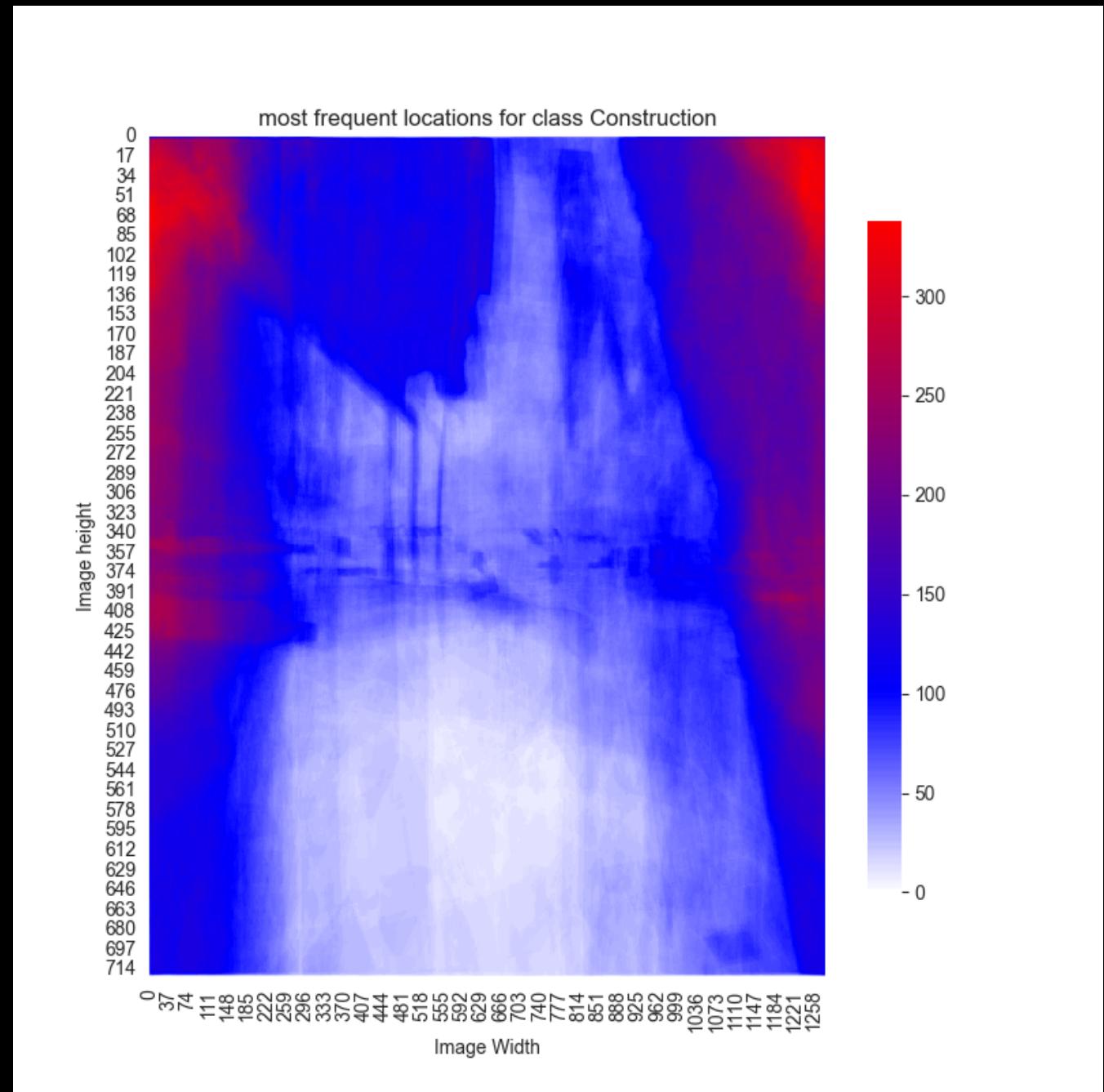
SUBMISSIVE CLASSES



SUBMISSIVE CLASSES



SUBMISSIVE CLASSES



SUMMARY

- The solutions

After this study. We must do the following:

- Focal loss function to emphasize small less occurring objects.
- weight each class based on it's occurring.
- careful data augmentation based on what each image have.



THANK YOU