

Detecting and Classifying Ice Seals from Aerial Images

Cody Can

2022/06/13

Outline

- Problem Statement
- Data Acquisition
- Model Training and Performance
- Conclusions

Problem Statement

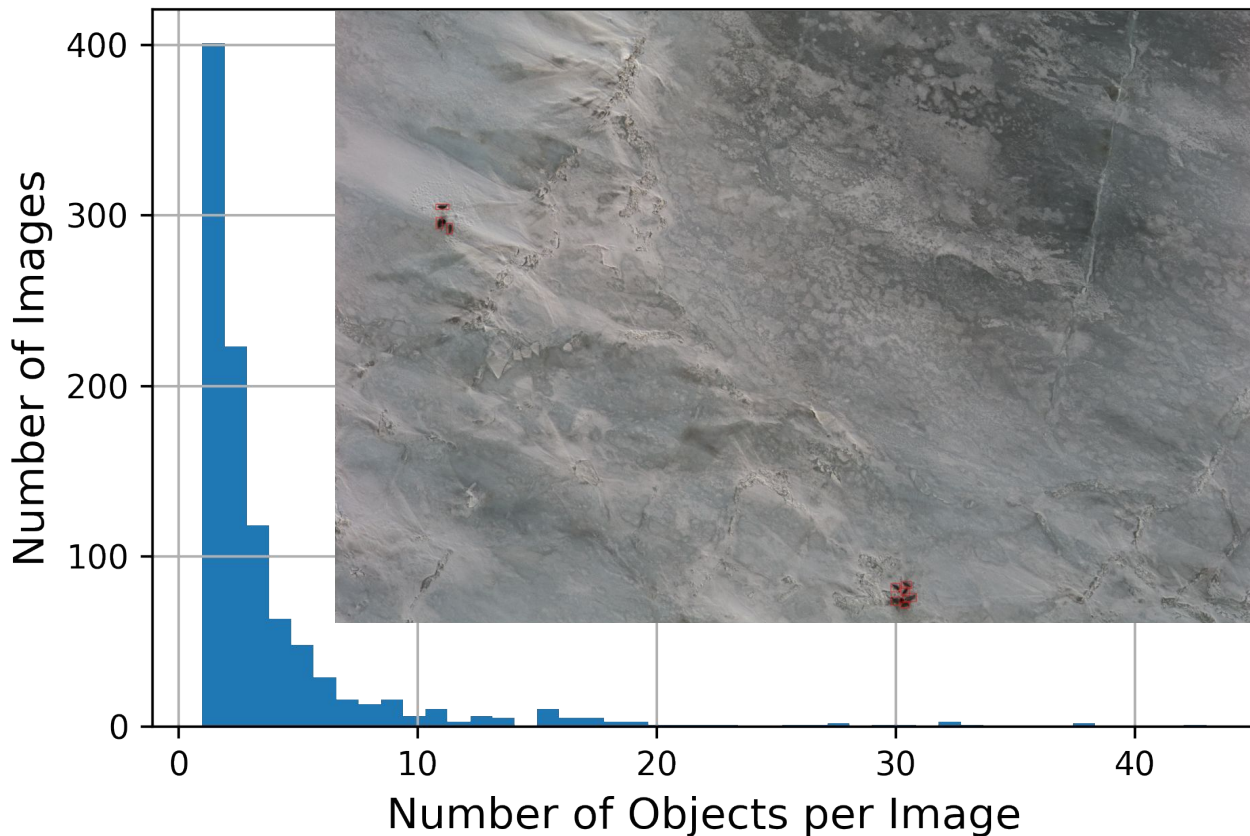


*Bearded seal in Kotzebue Sound, Alaska.
Credit: John Jansen, NOAA Fisheries*

- Global warming has led to massive ice melt, affecting the habitat of many animals
- Population survey is important
- Can we build a good computer vision model to detect and count ice seals from aerial images?
- It is can be challenging (big images, small objects)

NOAA Arctic Seals Dataset

Distribution of the Number of Objects

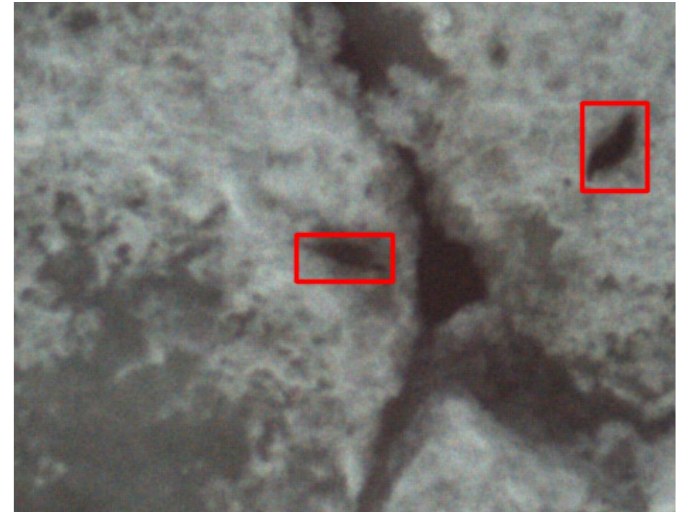


- 40,000 RGB images
- 4,000 are labelled
- Each 40 MB, 1+ TB total
- Average: 3.5 objects per image

A More Challenging Image

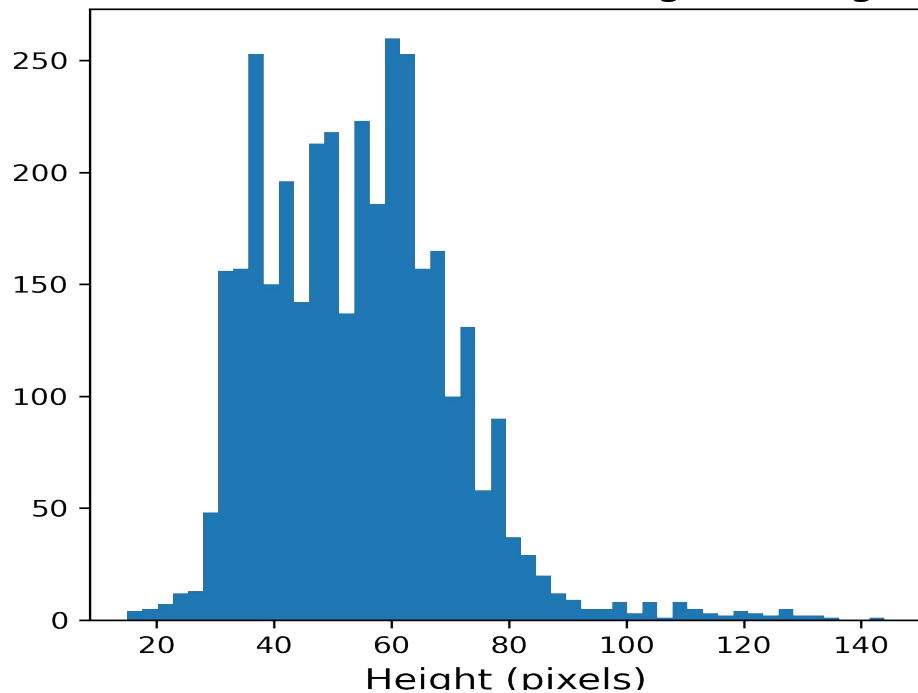


- Non-uniform background
- Objects are spread out
- Objects blend with the background

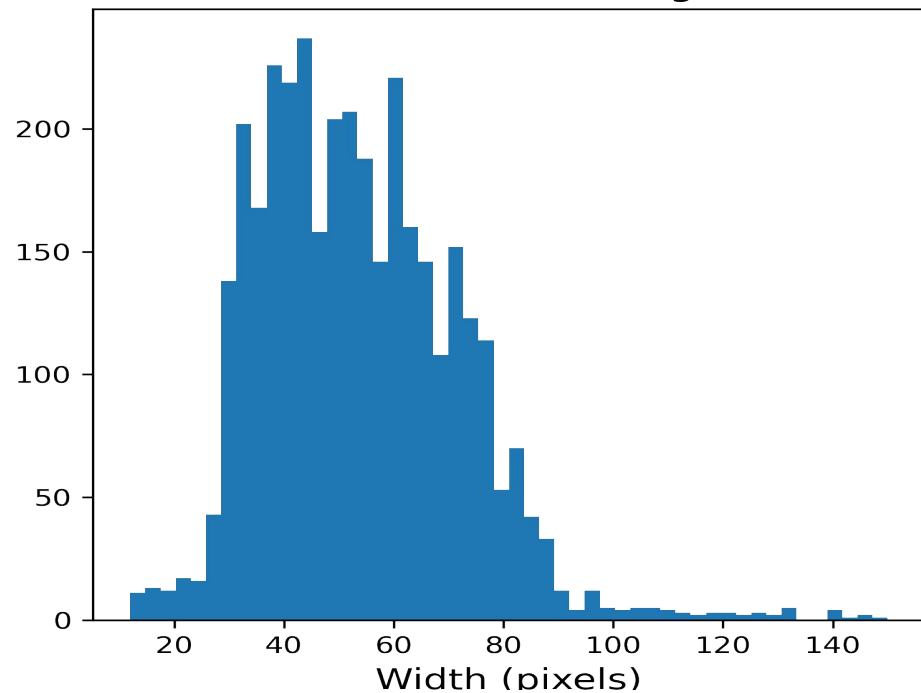


Bounding Box Sizes

Distribution of the bounding box height

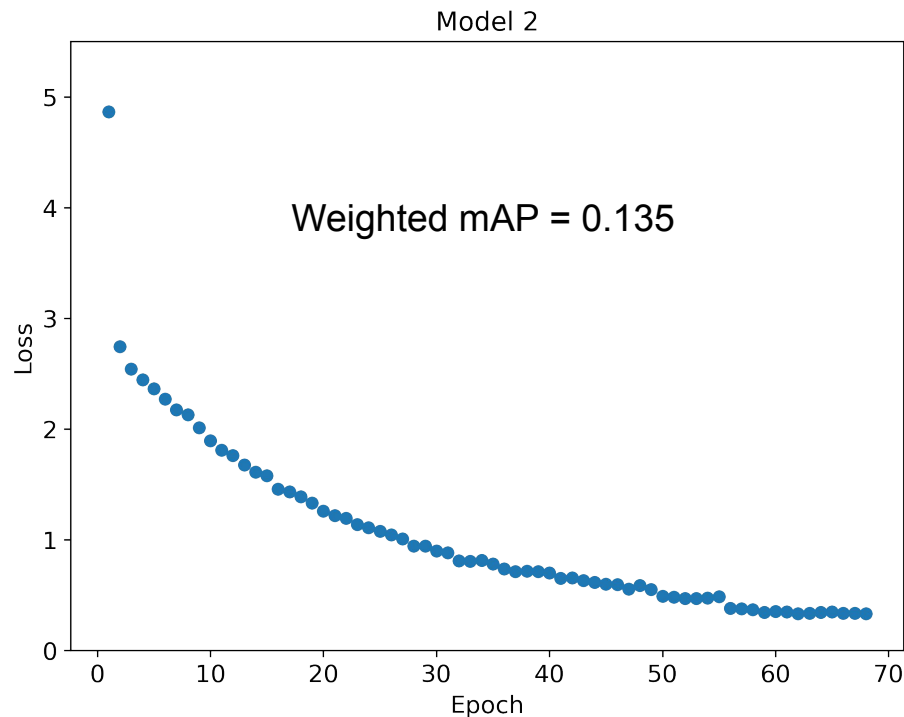
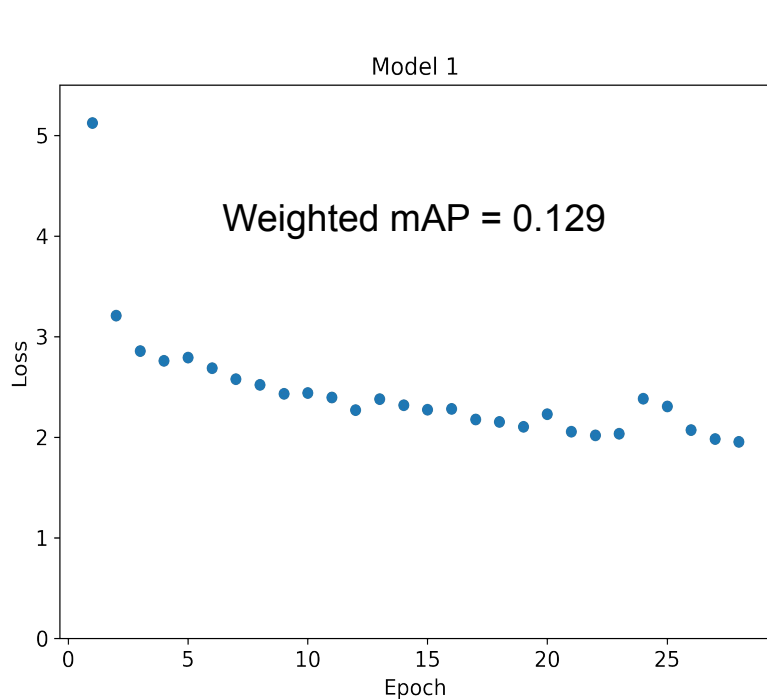


Distribution of the bounding box width



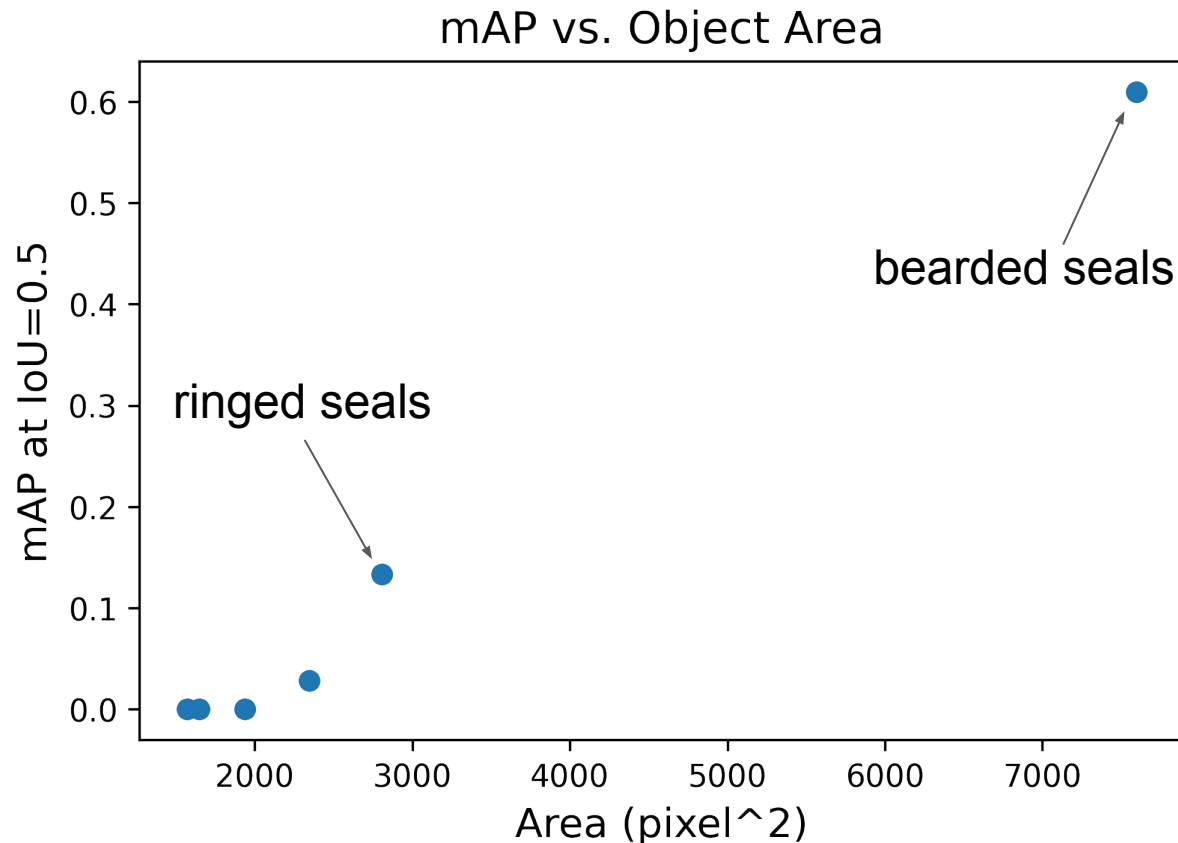
- Mean bounding box size: 50 x 50
- Image size: 6,576 x 4,384

RetinaNet: Training and Performance



- Each model took ~40 hours to train on Colab Pro TPU
- Model 1 trains slowly because of random transformation

Performance vs. Object Size



- Work quite well for bigger objects (bearded seals)
- 6 classes total, ringed seals account for 80%
- Need to further optimize the anchor boxes

Conclusions and Future Works

- Both models only work well on bigger objects
- Revisit the anchor box optimization to make RetinaNet perform better on smaller objects
- Increase the number of images in the the train dataset
- Try Microsoft Azure cloud computing since the original dataset is stored in an Azure blob container

Thank You!