Identifying animals in camera trap footage

Project Update - Milestone 2

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Module: Machine Learning Lab
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Motivation

?

→ large-scale camera trap projects create millions of images that are usually **manually annotated!**

→ automating animal detection is desirable...

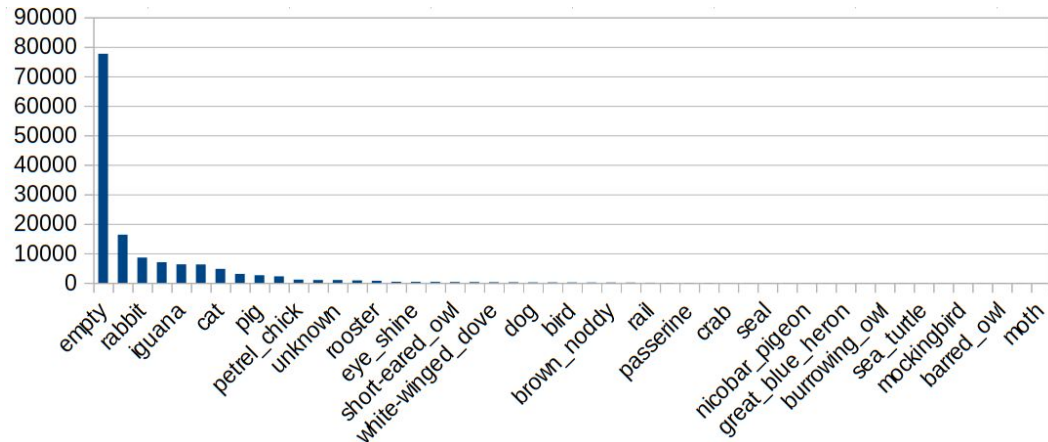... to **free up resources for biologists** or scale up their studies!

Dominican Republic, Cabritos Island

Data

- **dataset:** Island Conservation Dataset (Pacific Ocean & Caribbean)

- **characteristics:** 100 k RGB images, 47 classes, imbalanced

- **challenges**
    - animals are often only **partly visible**
    - high resolution, different sizes
    - many different **landscape types/backgrounds**

Baseline & Model

Baseline: always predict majority class
Accuracy is 60% (= empty image)

Image Preprocessing
- simple
    - random crop to smallest image size (1280 x 1024 px)
    - transform to tensor
    - normalizing
- more complex (data augmentation)
    - horizontal flipping
    - more controlled cropping (e.g. using bounding boxes)
    - grayscale
    - downscale images to smaller size

Model: Convolutional Neural Networks (CNNs)

- ResNet-18 achieved 98% accuracy (3.7 million images, 27 classes, data augmentation when trained from scratch (Tabak et al., 2018)

Outlook

select subset of 3-10 most frequent classes

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implement/load ResNet-18

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implement distributed hyperparameter tuning

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small-scale training on my CPU

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large-scale training on the university GPUs