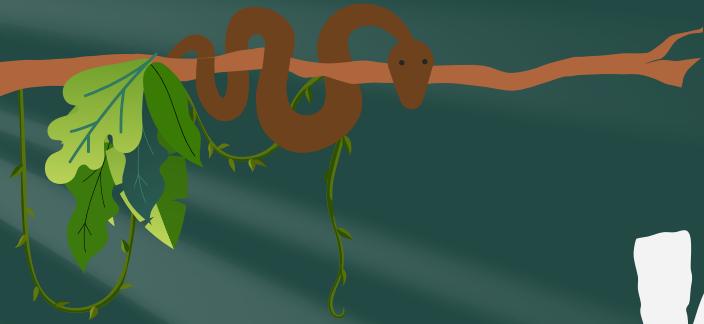


Conservision:

Wildlife Image Classification

Luisa Gonzalez, Jerry Montes,
Franco Sanchez, Robert Sarno



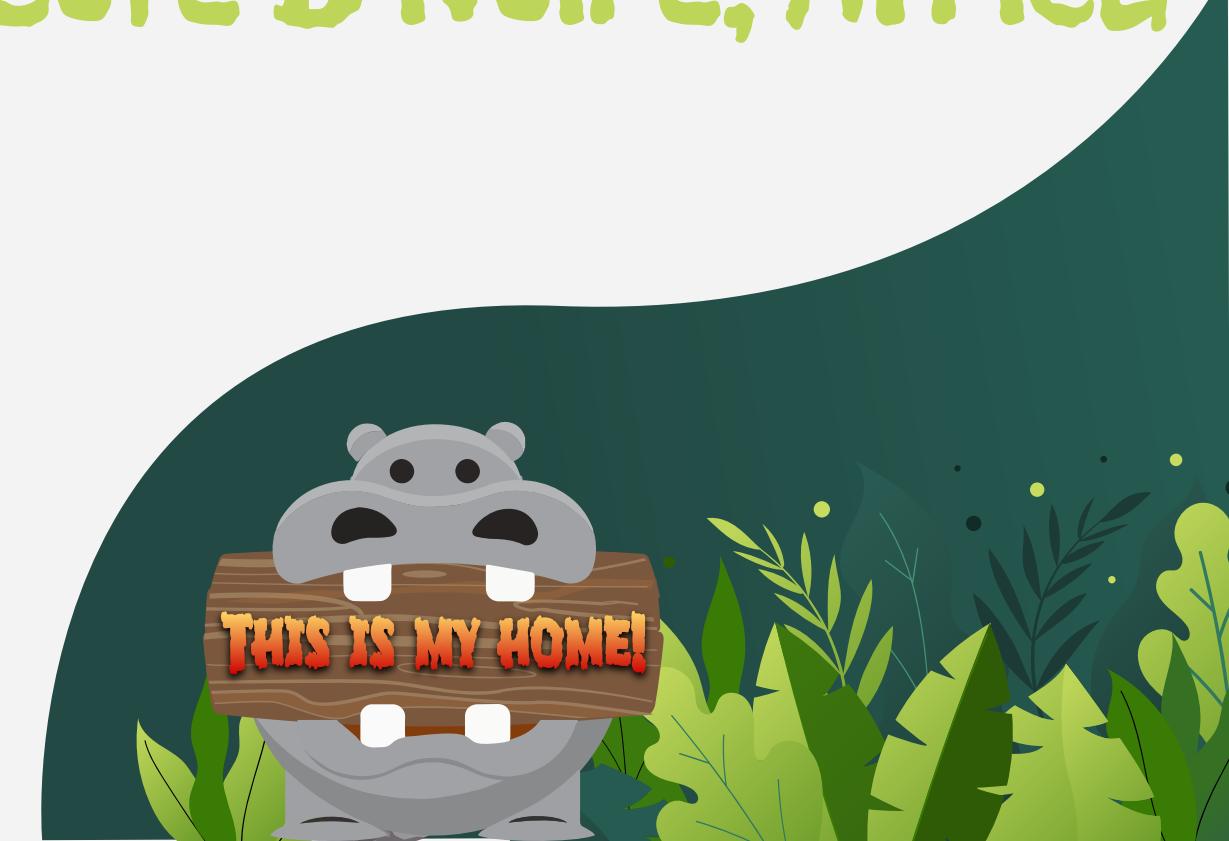


WELCOME TO





Location: Côte D'Ivoire, Africa



Timber Logging





Poaching

(Illegal) Gold Mining





Farming

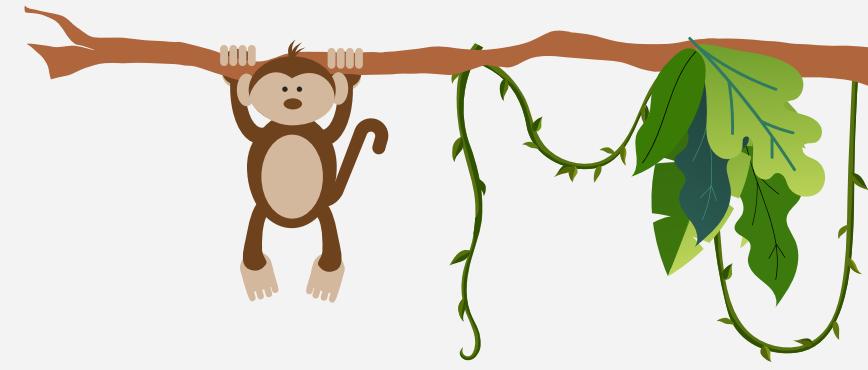
Problem Statement

Multiclass Classification Model



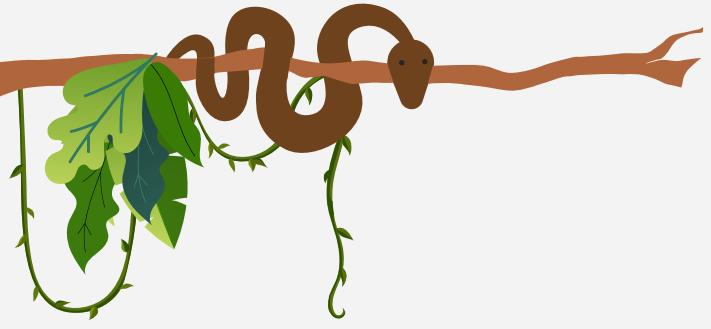
- Conservationists have installed **148** camera traps throughout the park in order to monitor **7** animal species groups
- Once processed, the images will greatly aid conservation efforts
- Our team was tasked with developing model that classified each image as belonging to **1 of 8** classes (*including blank*)





What animal species are we interested in studying?





Studying 7 animal species groups:

-  Antelope/duiker
-  Bird
-  Civet/Genet
-  Hog
-  Leopard
-  Monkey/Prosimian
-  Rodent



Antelopes/Duikers

Antelopes/Duikers both belong to

Bovidae family

- Most are diurnal, but Bay duiker is nocturnal
- Poached** for their meat, coat, and use in traditional medicine
- Some species at risk of extinction due to **deforestation**



Bay duiker

©Francisco Herrera

Birds

- There are **250+** species of birds at the national park, very few of which are threatened/endangered
- They are active during **daylight** hours



Black-throated coucal

Civets/Genets

- Civets/Genets both belong to **Viverridae** family
- Both groups are mostly nocturnal
- Coat contains **spots and stripes**
- **Captured** and kept by those who want an exotic pet and/or musk
- **Hunted** for their meat and fur



African civet

Hogs

Hogs have lengths between 4ft. 3 in. to 6 ft. 11 in. They are generally **nocturnal**, but in cold periods they are commonly seen during daylight hours.

- They are threatened by **deforestation** and by **hunting** for food.
- The species, however is currently classified as 'Least Concern'.



Giant forest hog

Leopards

- Single leopard species calls park home: ***Panthera pardus pardus***
- Mostly nocturnal
- **Hunted** for their fur, claws, whiskers, tails, and meat
- **Threatened** by habitat fragmentation and reduction in prey



African leopard

Monkeys/Prosimians

The park is home to **eleven** primate species. Three species are **nocturnal** and are not under threat. The rest are **diurnal** and a few of those species are in threatened by **over-hunting** and **deforestation**.

Prosimians are primarily **nocturnal** and their population is threatened by habitat loss due to mining, agriculture, hunting



Sooty mangabey

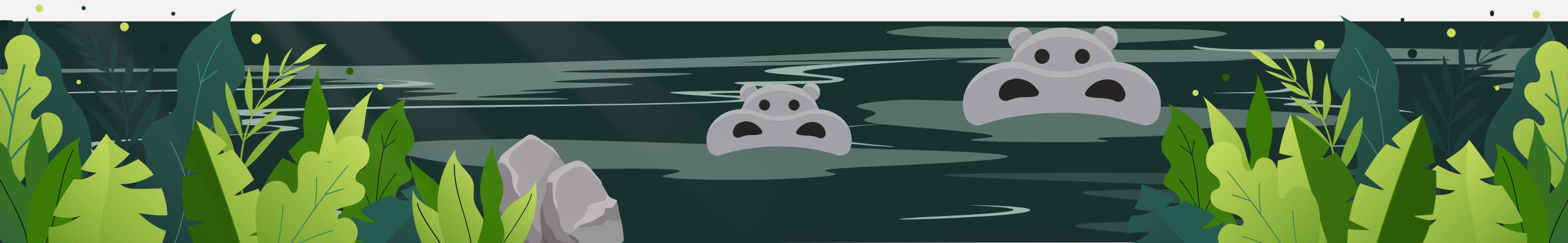
Rodents

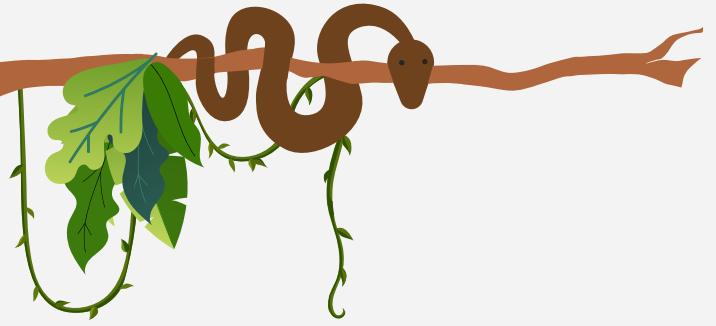
- Snake icon: Tai National Park has several rodent species, including rusty-bellied brush-furred rat, edward's swamp rat, and the woodland dormouse
- Snake icon: Rodents are both **nocturnal** and **diurnal**



Woodland dormouse

I spy with my little
eye...





An antelope/duiker!



A bird!

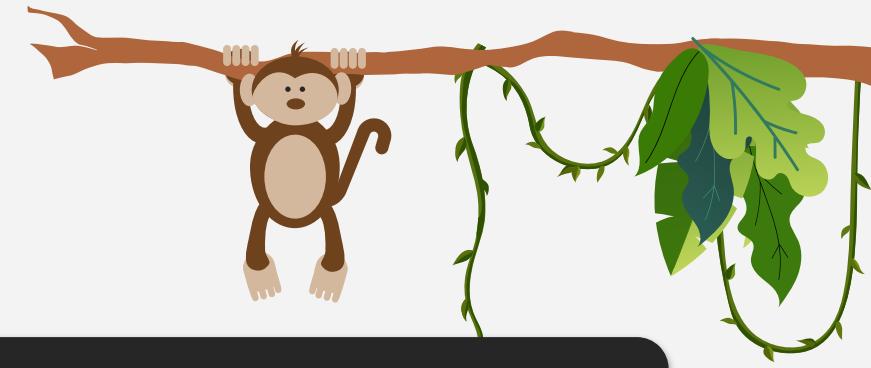


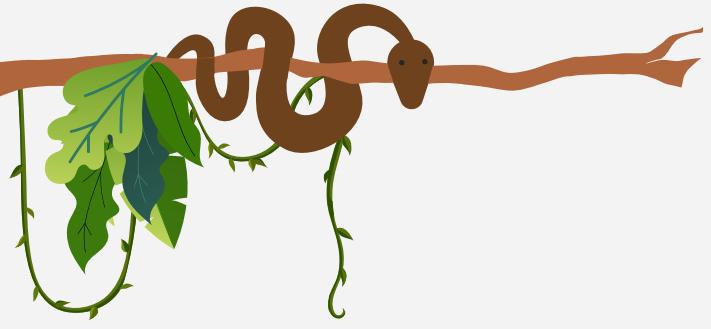


A civet/genet!



A hog!

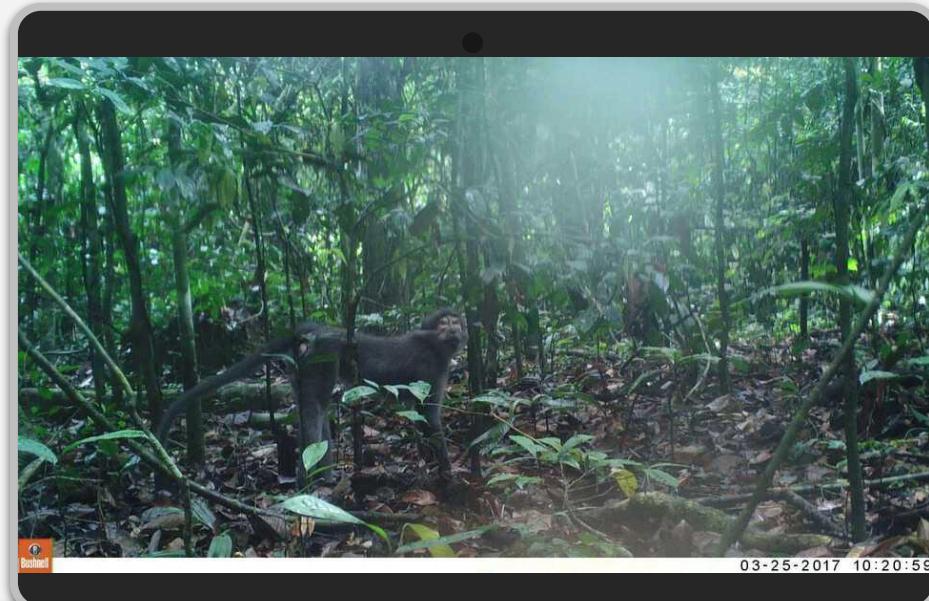




A leopard!



A monkey/prosimian!

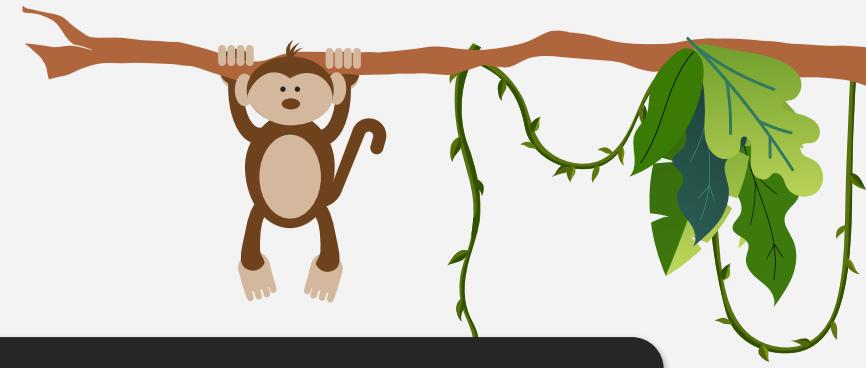




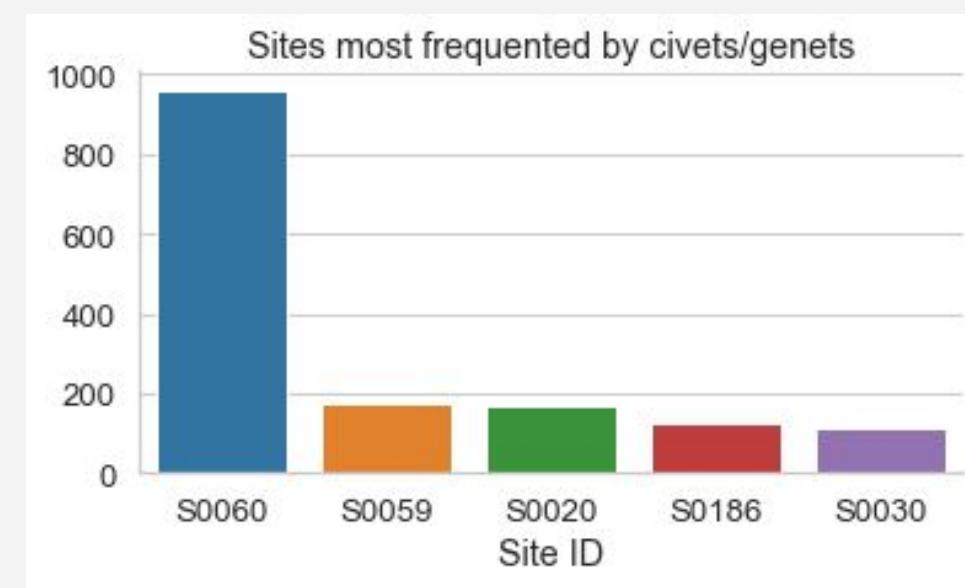
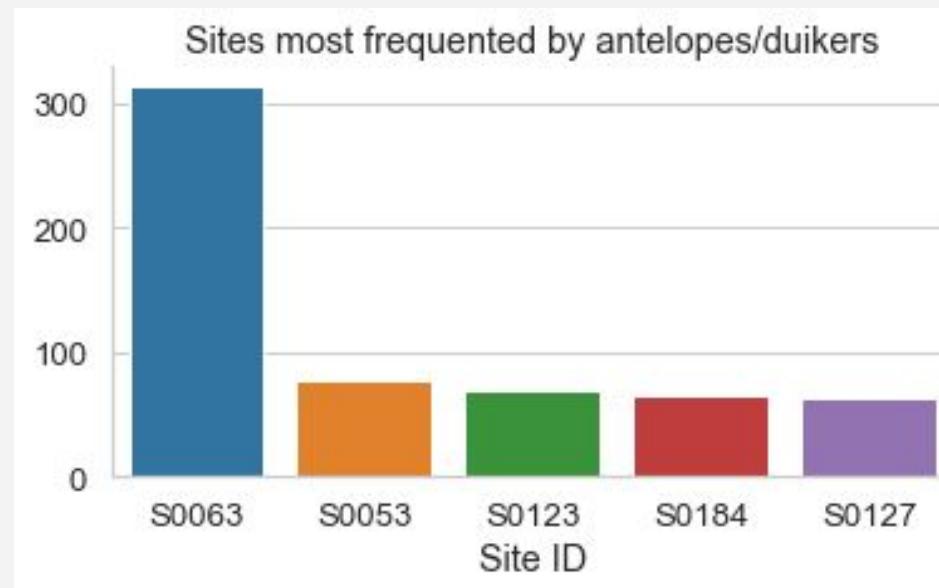
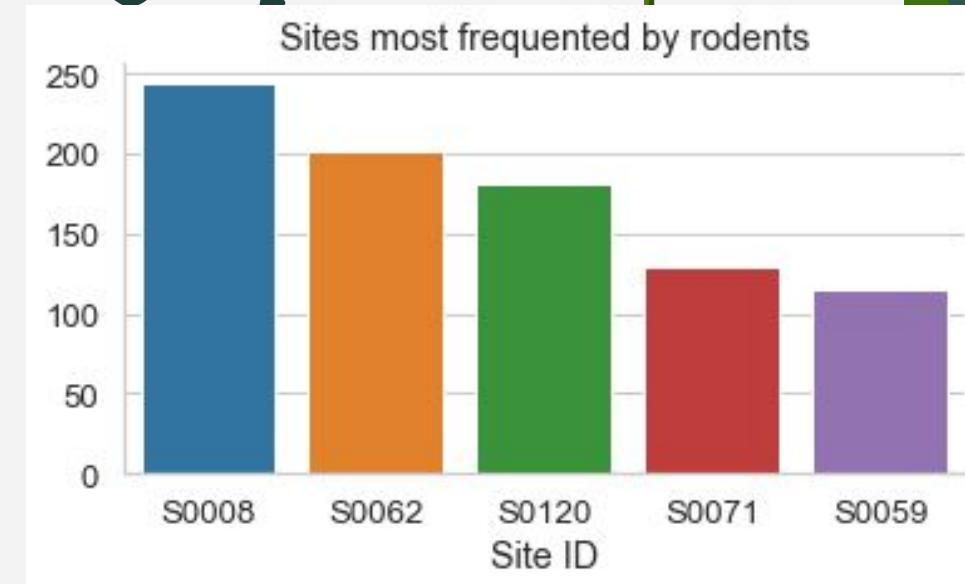
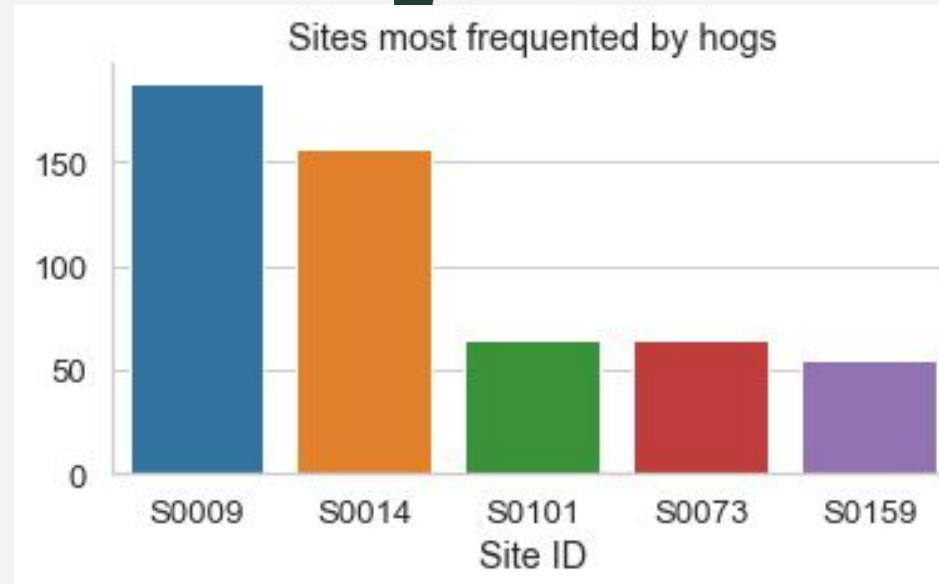
A rodent!



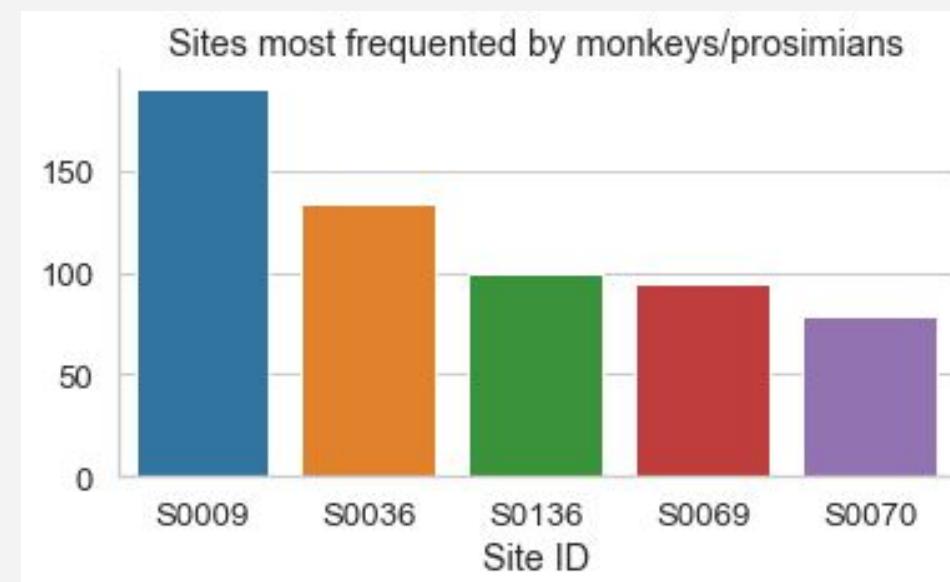
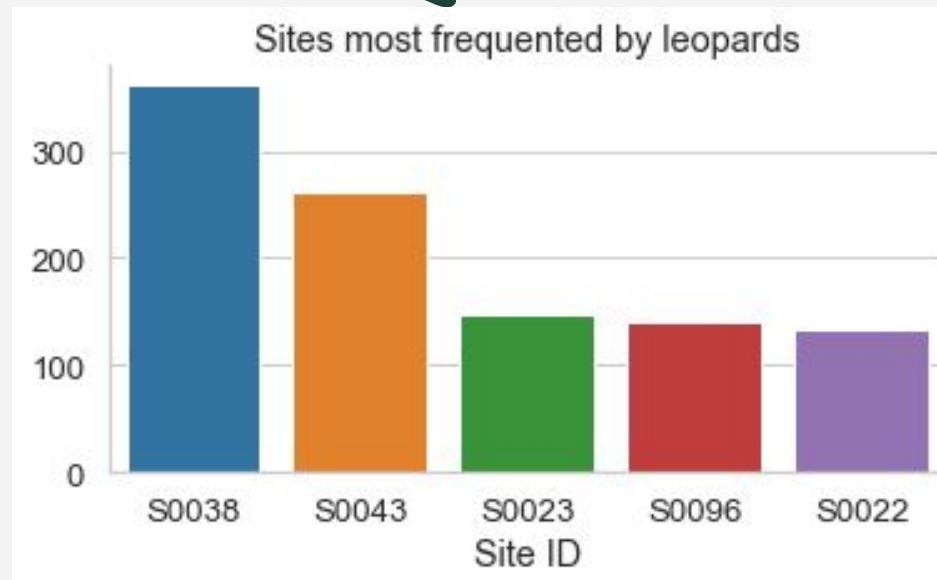
BLANK! (No animals)



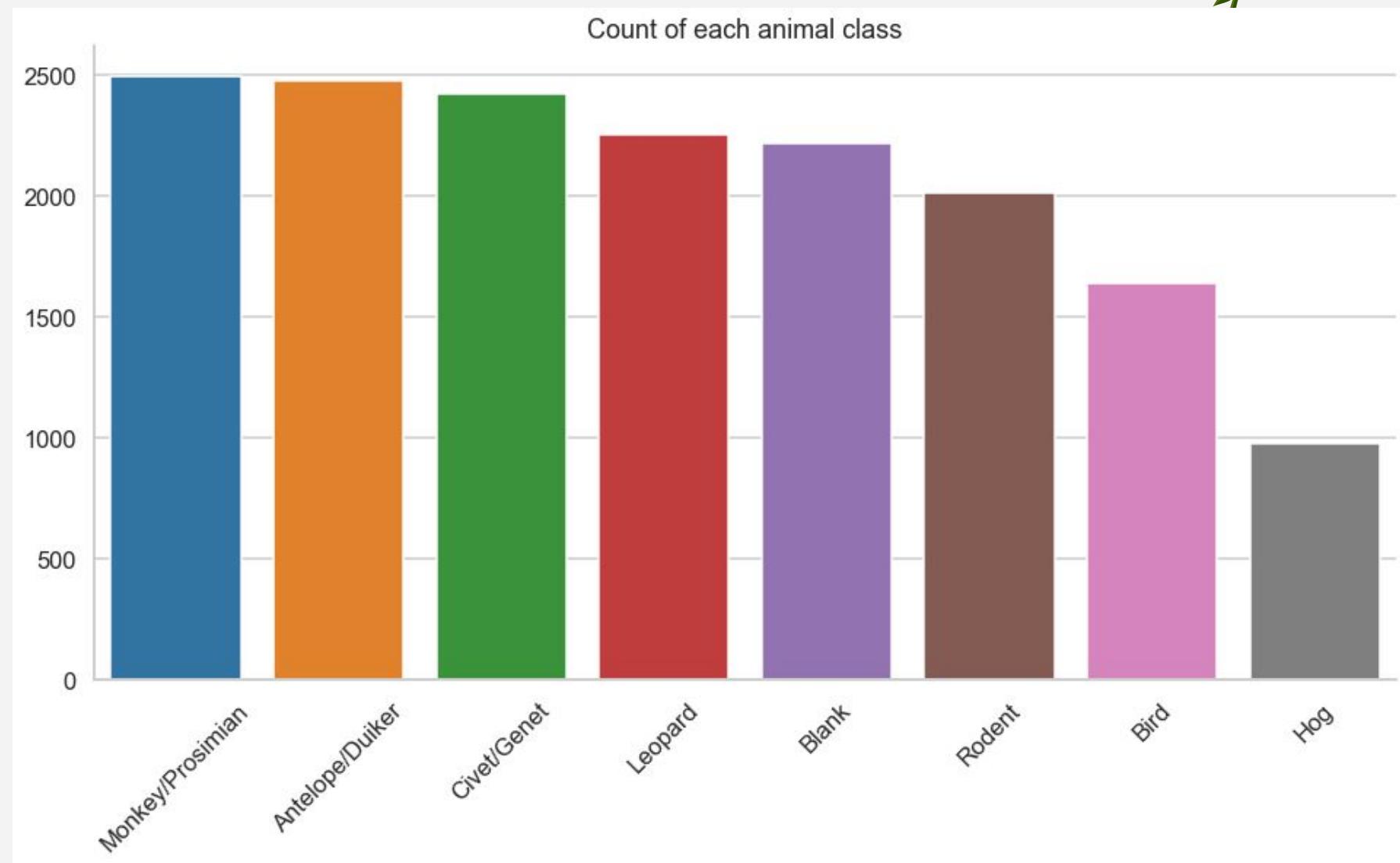
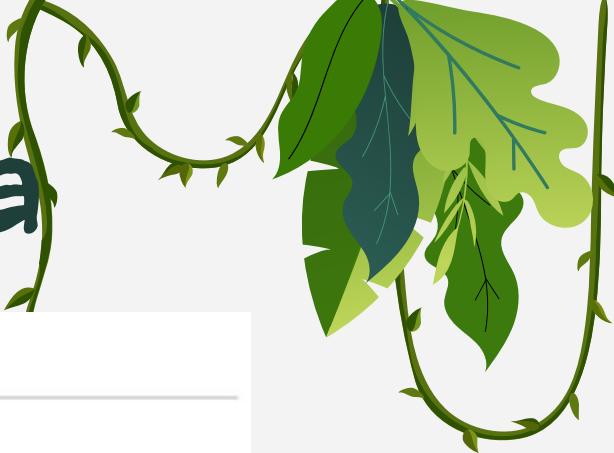
Most frequented sites by species



Most frequented sites by species, cont.



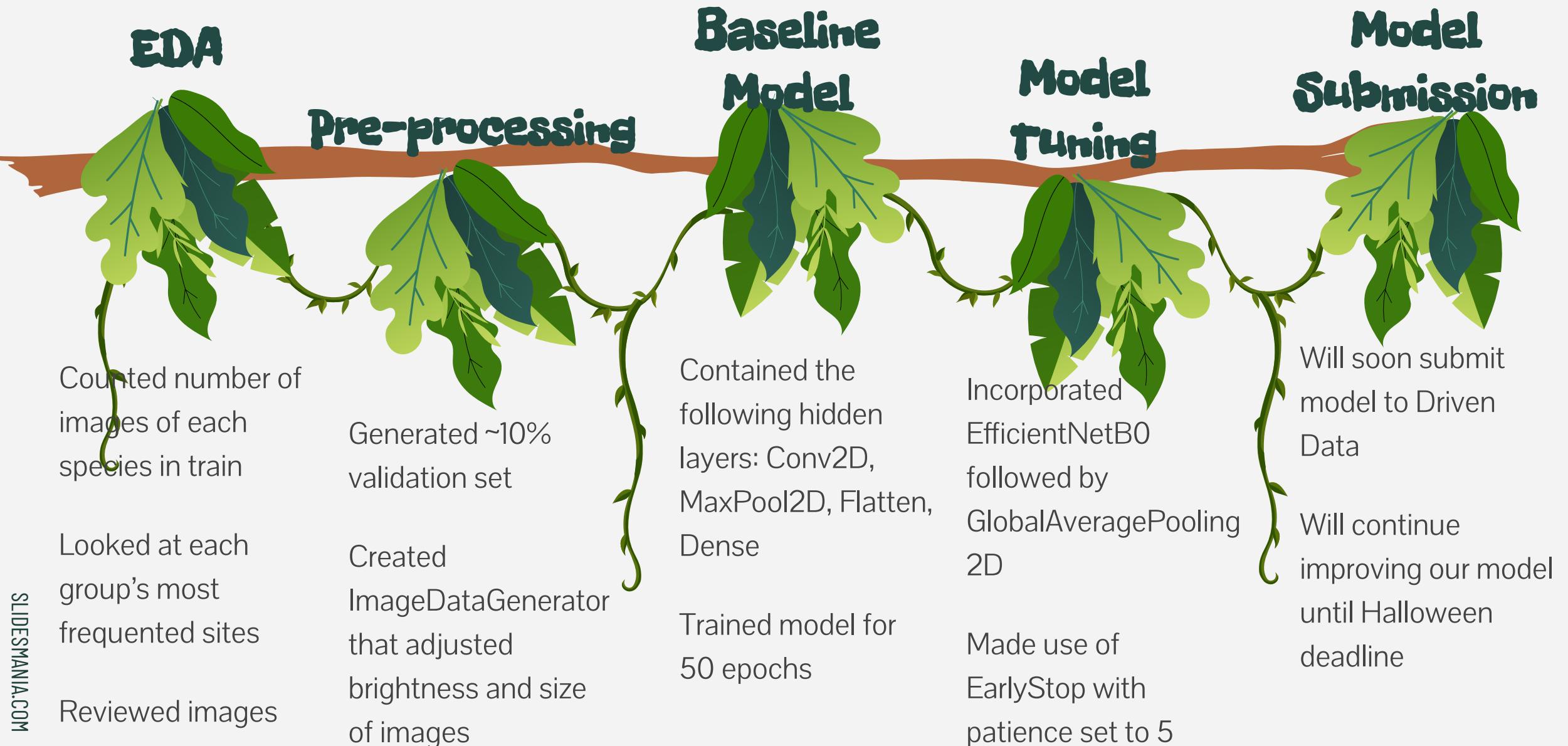
Species count in the training data





Model Time

Building our neural network



Best Model (so far)



ImageDataGenerator hyperparameters:

- Brightness range: [0.2, 1.0]
- Target Size: (256, 256)



Input Layer: Sequential



Hidden Layers: EfficientNetB0,

GlobalAveragePooling2D



Output Layer: Dense



Early Stop: monitor 'val_loss' w/ patience of 5



Best Model's Scores



of epochs run w/ Early Stop: 15



Accuracy: .62



Validation Accuracy: .46



Recall: .38



Validation Recall: .28



Precision: .86



Validation Precision: .59



Confusion Matrix

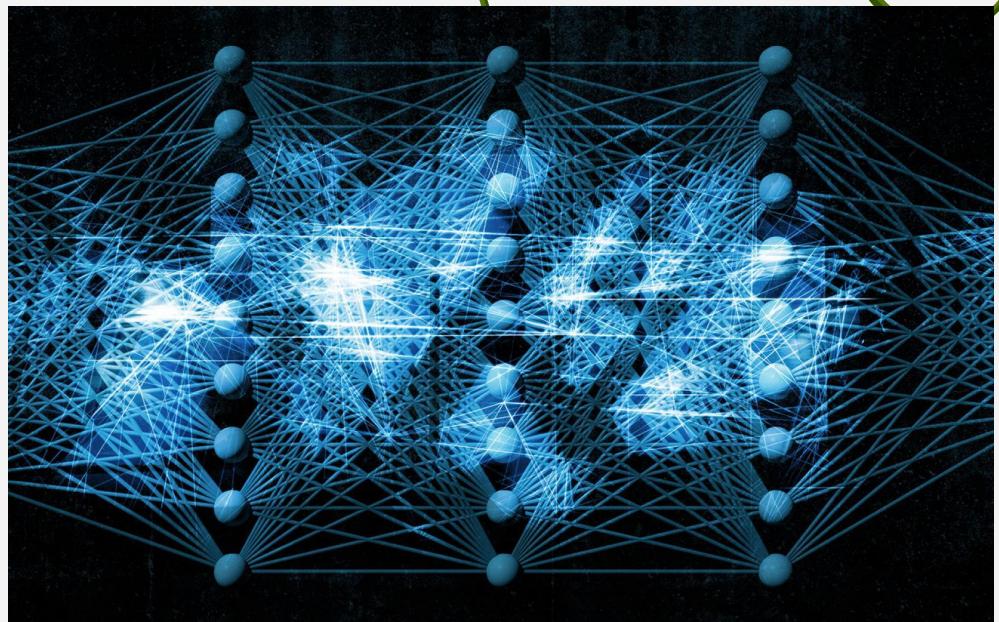


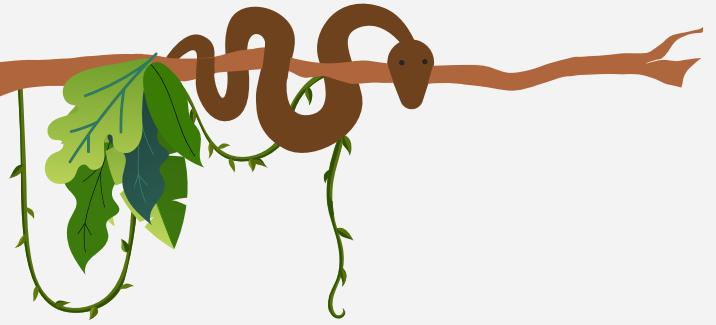


Let's test our model!

Limitations

- 🐍 Some images contained chyrons in lower 7%
- 🐍 A few species groups have similar physical characteristics (e.g. spotted coats)
- 🐍 To the naked eye, train images were difficult to classify due to low image quality and photos being out-of-focus





Future Directions

- 🐍 **Implementing** 7% height shift range to remove chyron
- 🐍 **Adding** vertical/horizontal flips
- 🐍 **Grayscale** all images
- 🐍 **Feeding** site information into neural network
- 🐍 **Removing** site information altogether



Conclusion

- Tracking species population sizes will allow conservationists to know where to direct resources
- Monitoring each species group's most frequented sites will aid anti-poaching efforts
- Now classified, images captured by camera traps will be of great use to conservationists studying each species group





questions?





Thank you!

