Using very-high-resolution satellite imagery and deep learning to detect African Elephants (Loxodonta Africana)

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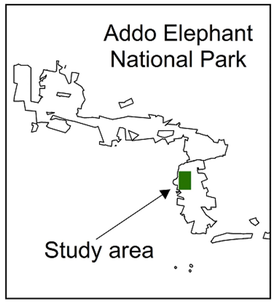
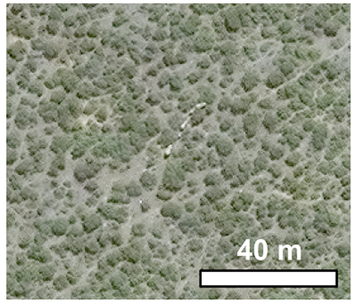
Introduction:

- Sixth-mass extinction / era of the Anthropocene
- Wildlife population counts vital to monitor longitudinal trends and decline
- Satellites + object detection (Faster RCNN) might be used for monitoring

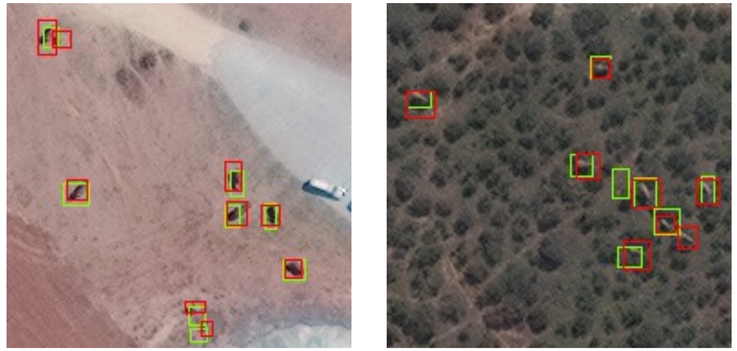
Case study: Detecting elephants



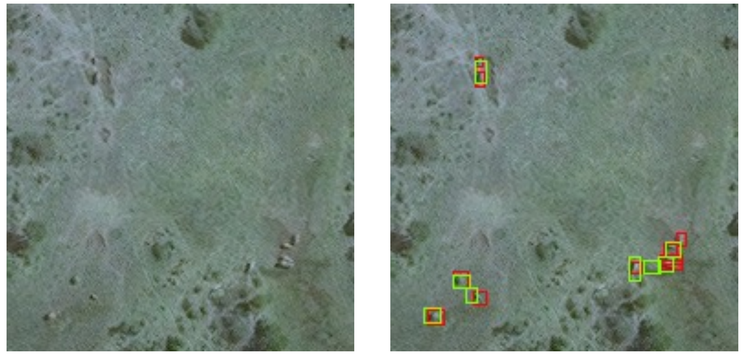


- Fully-grown bull elephant shows up in less than 15 pixels

Qualitative results:

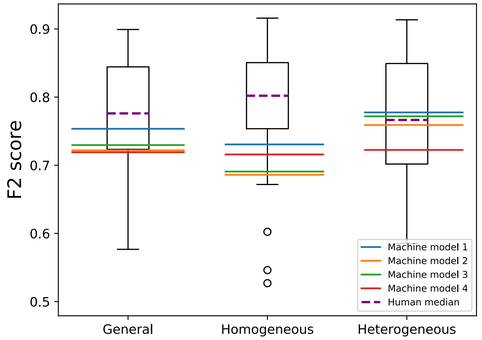


Study area



Test area (Kenya): coarser resolution + calve presence

Quantitative results:



- TensorFlow Object Detection API (faster_rcnn_inception_resnet_v2_atrous_coco) vs 51 human volunteers
- 24 test (study area) 600x600 sub-images

Summary/Conclusion

- First study to detect elephants in satellite imagery and first study to detect wildlife in heterogeneous background
- Existing object detection models detect elephants on par with humans
- Trained models are generalisable to new areas
- Worldview Legion constellation (Maxar), 6 sats/29cm/15 revisits and Pleiades Neo constellation (Airbus) 4 sats/30cm/2 revisits will expand wildlife monitoring capabilities