

# Using drones to estimate crocodile populations

## Cautiously counting crocodiles

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### 1 Intro

- 🦎 Aid in crocodile management and conservation efforts through non-invasive population estimates.
- 🦎 Need to standardize counting methodologies across crocodile farms in South Africa
- 🦎 Developed a computer vision model to localize crocodiles in UAV imagery.
- 🦎 Associated keypoint extraction model to learn crocodile physical characteristics.
- 🦎 Data: Geo-referenced orthographic photos from South African crocodile farms and rivers.
- 🦎 Challenges: Lack of annotated data, juvenile crocodiles.

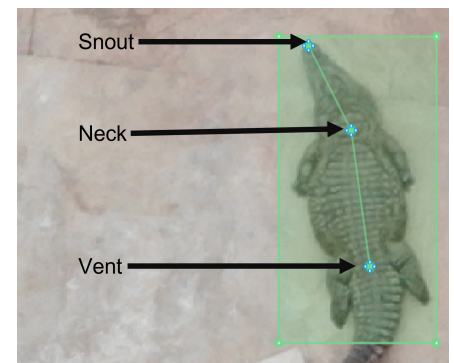
### 2 Methods

- 🦎 Evaluated both YOLO and faster-RCNN based model architectures
- 🦎 Trained on ~ 70 manually annotated UAV images

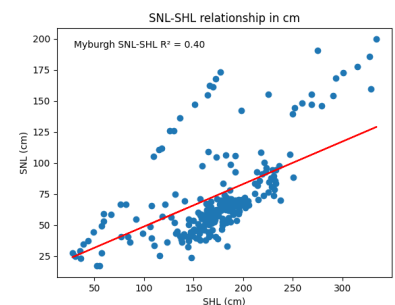
### 3 Results



- 🦎 Transfer learning approach failed to generalize.
- 🦎 Errors included double-counting, false positives, and out-of-distribution object misidentification.
- 🦎 Model is sensitive to altitude
- 🦎 More prone to false negatives
- 🦎 Model validation on different environments demonstrated satisfactory generalization and correlation with established Nile crocodile metrics.



- 🦎 Processing large geo-referenced GeoTIFF files in 2000x2000 pixel patches, possibly missing crocodiles at patch borders. Allows extraction of features in real measurements (m/cm)
- 🦎 App produces ESRI-compatible shapefiles



- 🦎 Red line indicates established Nile crocodile SNL-SHL relationship.

