Using pre-trained YOLO models for Elephant detection and back lengths calculation from aerial images, for monitoring elephants population in Southern Africa.

Automating Rapid Elephant Population Assessment Using YOLOv8

INTRO

• There is a benefit in monitoring elephant populations in Southern Africa. To be able to monitor the populations, we are supposed to determine age-specific survival and reproduction rates within each population.

• The main challenge lies in the time-consuming and labor-intensive process of counting and measuring large elephant populations from aerial digital images.

• We address this challenge by using image processing techniques to develop an analytical pipeline that can detect the number of elephants and calculate their back-length in each image.

METHODS

I. Data Preparation :
• Used Roboflow online annotation tool to annotate images.
• The final dataset consisted of the original images and text files with annotations corresponding to each image.
• The dataset is split into training and test sets.

II. Modelling:
• Pretrained machine learning models were trained to address the objective, below are two pre trained model used.
❖ YOLO5
❖ YOLO8
• Calculated the back-length by using the hypotenuse of the bounding box.

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RESULTS

• YOLO5 model performed poorly on both the test and validation dataset.
• YOLO8 performed significantly better and can be used to detect the elephants and calculate the back length.

Results of YOLO8 model with confidence score

DISCUSSION

• Although the objectives of detecting the elephants and calculating their back-length was reached, experimentation with different models could potentially improve the performance.
• The dataset was limited, and some images were unsuitable for calculating elephant back length due to their positioning.
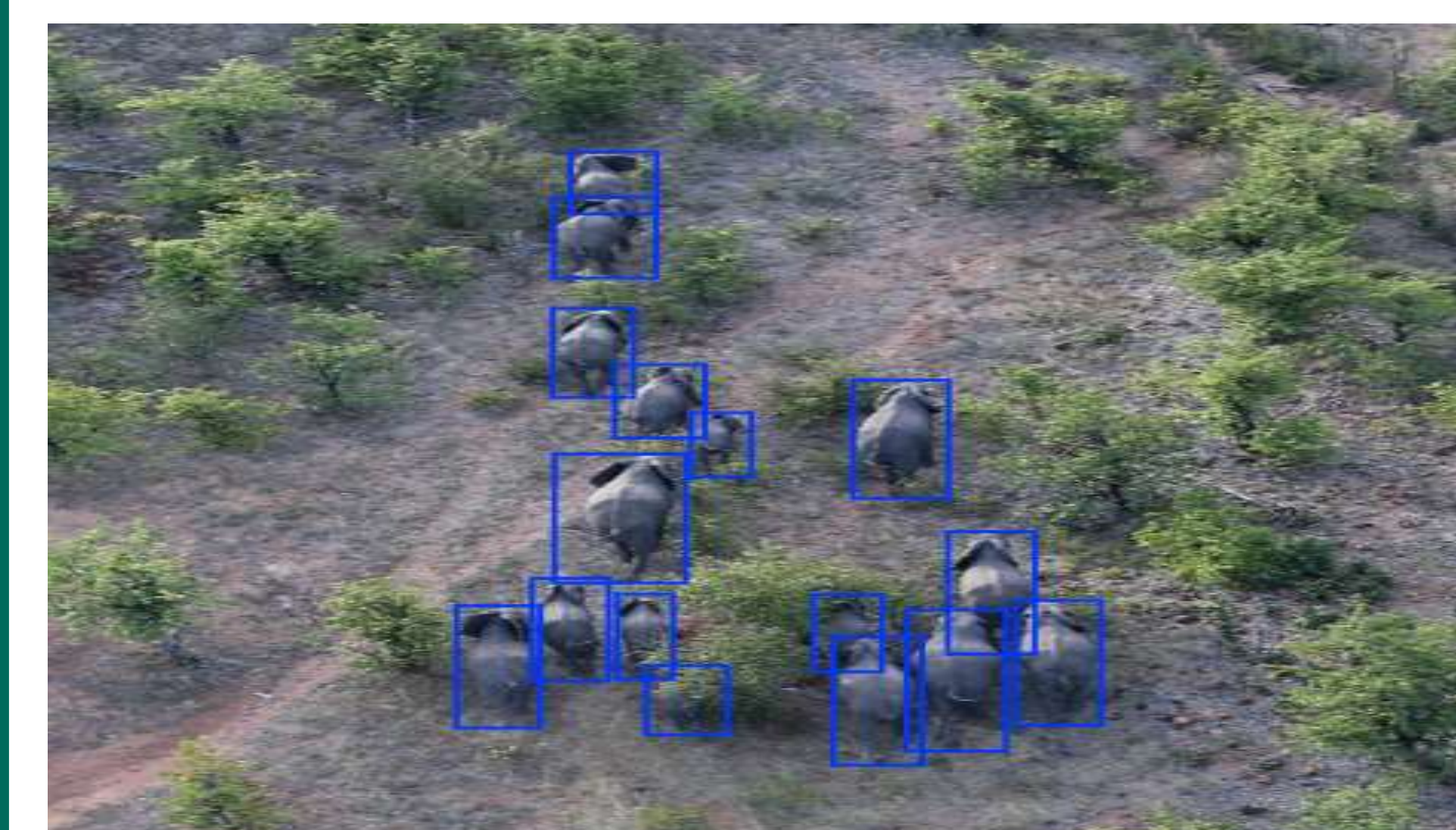
Original image

Model predictions

Annotated image

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