Ahmedabad University

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CSE623: Machine Learning: Theory and Practice

Group: 5 Project no.:11

Weekly Report 1

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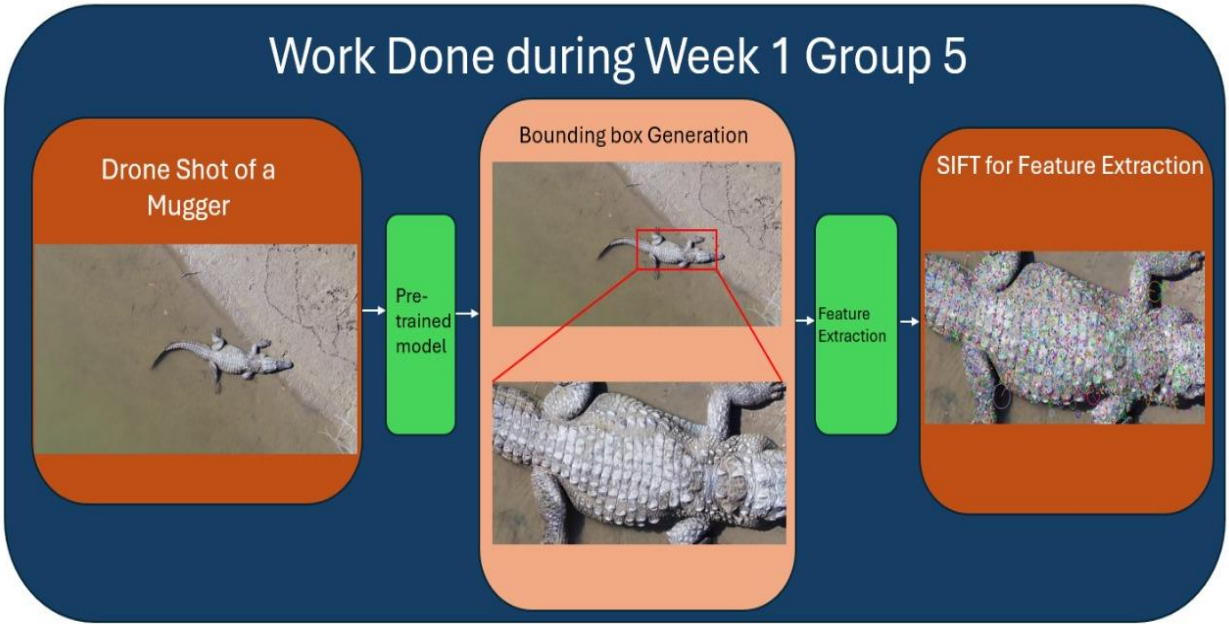
Summary:

Using Unmanned Aerial Vehicle (UAV) drone images the project works to detect wild mugger crocodiles (Crocodylus palustris). Research on mugger crocodiles requires individual identification because this species faces vulnerability which means population dynamics need monitoring along with behavioral pattern analysis. The current identification practices depend on invasive tagging methods that create stress in addition to disturbing natural environments of wild animals. The system provides solutions to identification challenges through the deployment of distinctive scute patterns for non-invasive identification processes. Various high-resolution imaging analysis methods now let researchers detect both specific animal subjects and separate different wildlife species effectively. Our system utilizes the YOLOv8 model which creates bounding boxes to establish exact location detection in addition to giving wildlife population monitoring both speed and scalability capabilities. Our system makes use of the model to identify wildlife effectively without dependency on human interaction and generates precise results for classification. This project design features flexibility which allows its use for multiple species dealing with similar conservation threats. The system brings substantial progress to ecological research by connecting automated identification capabilities with advanced image analysis systems.

Flow Chart:



Task completed:

1. Reviewed the data and literature available to us. The base paper proceeds as:
    - **Data Collection** – Used UAVs (drones) to capture images of free-ranging mugger crocodiles.
    - **Dataset Creation** – Built an annotated dataset focusing on the dorsal scute patterns of crocodiles.
    - **Model Selection** – Choose two CNN models: YOLO-v5l (with bounding boxes) and Inception-v3 (without annotations).
    - **Model Training** – Trained both models using 88,000 images from 143 individuals across 19 locations.
    - **Validation** – Evaluated the models using True Positive Rate (TPR) and True Negative Rate (TNR).
    - **Performance Comparison** – Found YOLO-v5l to be more accurate than Inception-v3 in identification and re-identification.
    - **Application & Conclusion** – Demonstrated that UAV imagery and YOLO-based models are effective for non-invasive wildlife monitoring.

2. Implemented the YOLO-v5l model on the annotated dataset, where bounding boxes were applied to mark the crocodile dorsal scute patterns. Generated tight bounding boxes for

each class of the crocodile of the training dataset. The bounding box image is then used for various feature extraction method implementations. The method implemented during this week is SIFT.

Goals for Next week:

1. **Compare the Feature Extraction Using Various Methods like PCA,ICA** – Use the results of this implementation for best and efficient model training
2. **Model Training** –Train the model and store image paths, extracted feature maps, and relevant metadata in a structured CSV file for efficient analysis.
3. **Identification of classes -** Use the trained model for identifying different classes.