Ahmedabad University

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# CSE623: Machine Learning: Theory and Practice

**Group: 5 Project no.:11**

Weekly Report 4

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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.

**Literature Review**

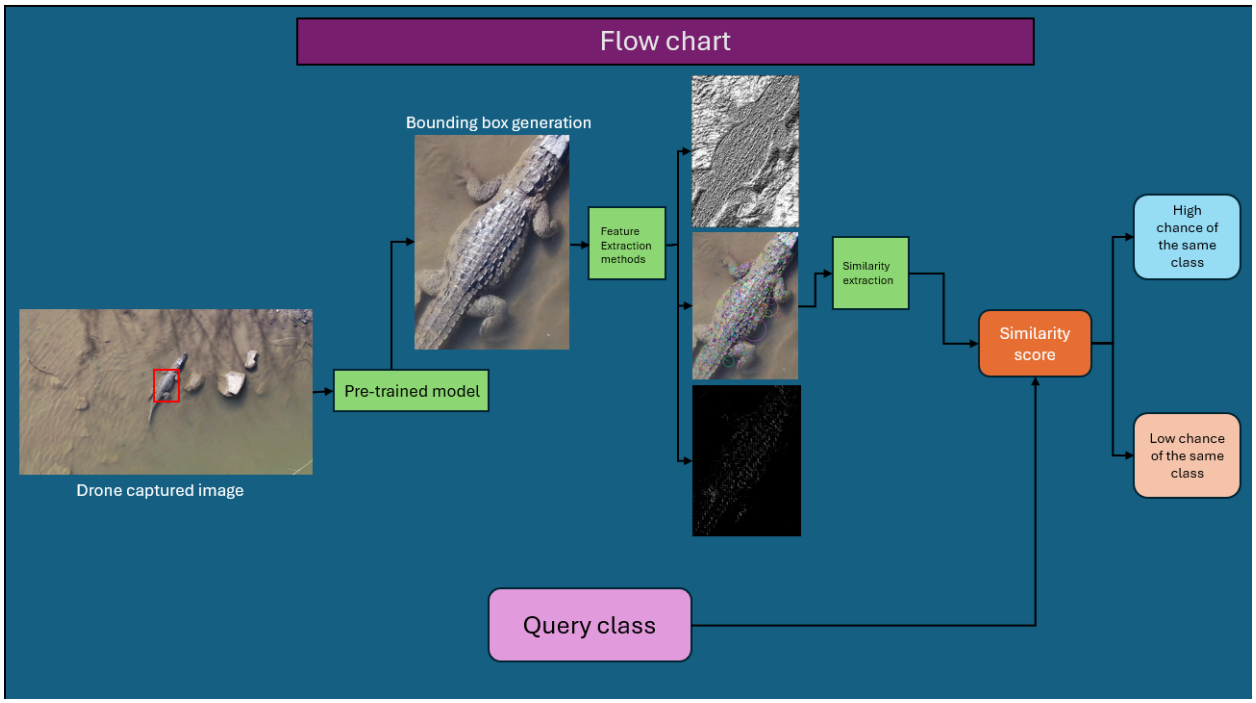
| Reference | Method Used | Pros | Relevance |
|---|---|---|---|
| **Identification of free-ranging mugger crocodiles by applying deep learning methods on UAV imagery [3]** | UAV-based CNN model (YOLO-v5l) for identifying free-ranging mugger crocodiles using dorsal scute patterns. | High accuracy in distinguishing individuals; Non-invasive approach using UAVs; Model showed 89.2% accuracy. | Basis for using UAVs and CNN for crocodile identification in free-ranging environments. |
| **From crowd to herd counting: How to precisely detect and count African mammals using aerial imagery and deep learning?[4]** | Deep learning-based remote sensing for wildlife monitoring. | High efficiency in large-scale monitoring; Automates wildlife recognition. | Supports the use of remote sensing and deep learning in animal identification. |
| **Do you get what you see? Insights of using mAP to select architectures of pretrained neural networks for automated aerial animal detection [5]** | CNN-based facial recognition for individual identification of primates. | High precision; Works well in controlled conditions. | Demonstrates CNN viability for biometric identification but highlights need for alternative approaches for non-facial species. |
| **Multispecies detection and identification of African mammals in aerial imagery using convolutional neural networks[6]** | UAV-based imagery with ML for reptile population estimation. | Effective in identifying large reptiles; UAVs reduce human disturbance. | Reinforces UAV effectiveness for ecological studies on crocodilians. |

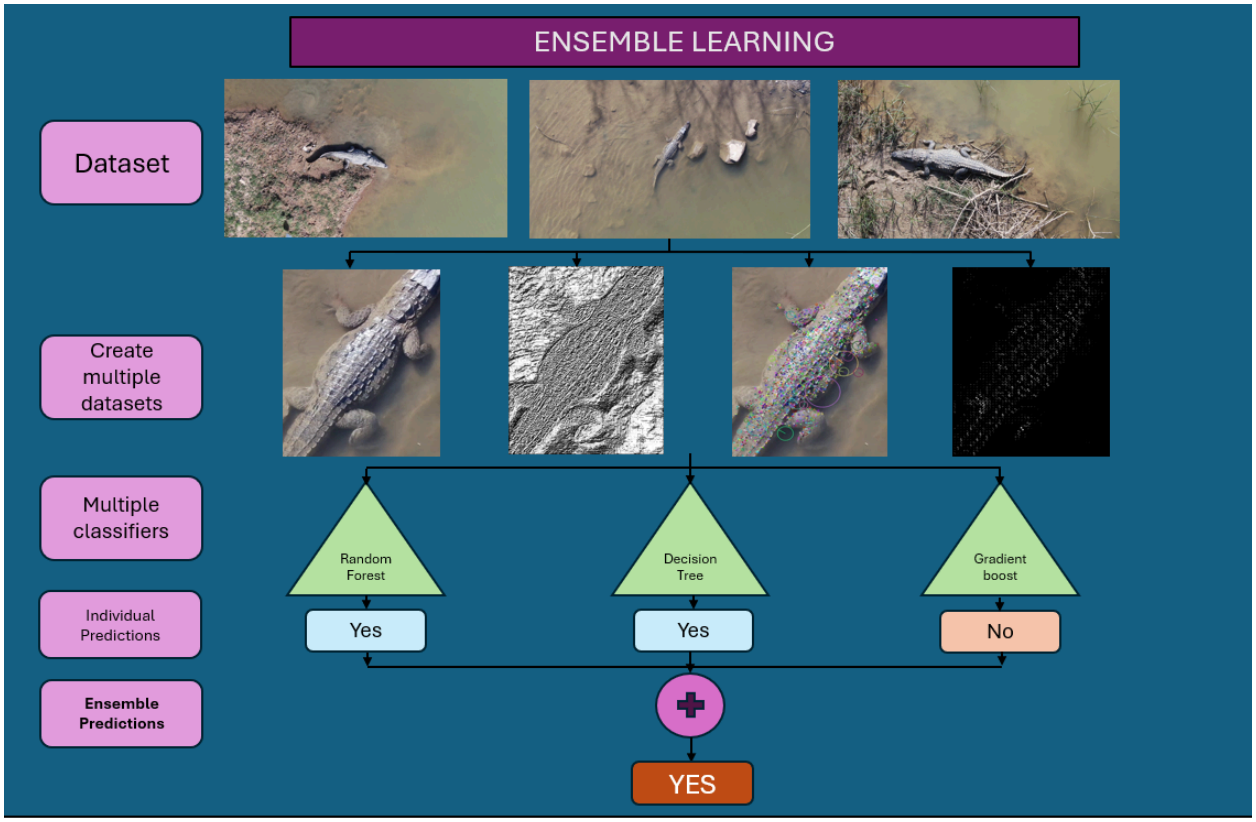
**Task completed:**

- Implemented merging of the SIFT and LBP features for efficient feature extraction.

- Trained different ML models like random forest, decision tree classifier for our ensemble learning approach.

**Flowchart:**






**Goals for Next week:**

1. **Model Training** –Training the ensemble learning model for mugger identification
2. **Incorporating new data** - New season mugger data incorporating for testing the accuracy of our model
3. **Comparing the results with CV approach**