Weekly Report 1

Automated Biometric System for Individual Re-Identification of Mugger Crocodile

Siya Dhaduk (AU2340022)
Rena Malhotra (AU2340018)
Shayan Pariyal (AU2340107)
Kaushika Rathod (AU2340133)

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1 Introduction

This project aims at developing an automated system that will be capable of recognizing individual Mugger crocodiles from images. The system has to identify whether a crocodile in a new image is already known or if it is a new individual. This is significant since the survival of individual Mugger crocodiles can be monitored in terms of population dynamics, movement and survival throughout time. During the first week, we concentrated on the initial problem awareness and the examination of the data set. The report summarises that progress.

2 Problem Understanding

The main issue of this project is to detect the specific mugger crocodiles using the non-invasive aerial images and deep learning technology. Conventional animal identification methods depend on physical tagging of animals or capturing of animals. This may be stressful, dangerous and logistically challenging for the large reptiles. Thus, the problem is that it is hard to create a stable computer vision system to be able to identify crocodiles in a natural setting and differentiate individuals according to the distinctive scute structure. As the information is gathered under uncontrolled conditions, the model has to be strong and must also be able to identify unknown individuals.

3 Dataset Exploration

Based on the available data, it is evident that the dataset is formulated on a real field-based identification problem and not a typical image classification task. The GIS records indicate that every crocodile specimen is associated with precise sites and dates, and this implies that the identification is based on the real ecological sampling. This implies that it is not only to identify images, but to trace actual animals through space and time. This interpretation is further reinforced by the open set test images, which demand that

the model should be able to recognise known individuals correctly and reject unfamiliar ones. Practically, this is equivalent to the way the system would be expected to operate in the wild where new individuals can always be possible. Generally, the data points to the differences in the environment, geography, and sampling conditions, which implies that the issues of robustness and the applicability to the real world are at the core of the problem.

4 Plan for Next Week

- Understand image preparation techniques such as resizing, normalisation, and filtering.
- Start with the data preprocessing steps required for the study.
- Analyse the architecture of the pre-trained Inception-v3 model used for identification.
- Examine how the model was trained and evaluate its strengths and limitations.

References

[1] B. Desai, A. Patel, V. Patel, S. Shah, M. S. Raval, and R. Ghosal,"Identification of free-ranging mugger crocodiles by applying deep learning methods on uav imagery," Ecological Informatics, vol. 72, p.101874, 2022.