Automated Animal Detection and Classification in Camera Traps using Computer Vision

Camera traps are a popular tool used by biologists to monitor and study animal populations and behavior. However, the manual categorization of camera trap data by experts severely limits data scale and research productivity. Automating this process using computer vision could make camera trap research scalable and efficient.

This project aims to automate the categorization of species in camera trap data using computer vision. The Caltech Camera Traps (CCT) dataset [1] provides a testbed for researchers to investigate their models' ability to generalize to diverse unseen locations, lighting conditions, and occlusions. The dataset can be used to predict if images contain an animal, detect that animal, and classify the animal.

The main challenge of this project is generalizing to a diverse set of unseen camera trap locations that have been captured both during the day and at night, which are not present in the training set. Additionally, the cameras are prone to false triggers, leading to empty frames, and may contain other objects (e.g. people or vehicles) that are not of interest.

The project will begin by implementing state-of-the-art computer vision algorithms for animal detection and classification. The performance of these algorithms will be compared, and areas for improvement identified. Novel ideas for improving the state-of-the-art will be proposed and implemented, such as incorporating temporal information into the animal detection algorithms to enable more accurate detection of dynamic animal behavior.

The project will be conducted using publicly available camera trap datasets, and participants will have access to computing resources and software tools for implementing and evaluating their

algorithms. The project is suitable for students with a background in computer vision, machine learning, or related fields, who are interested in applying state-of-the-art algorithms to real-world problems in conservation biology.

By participating in the project, students will have the opportunity to contribute to the development of automated animal detection and classification algorithms, which have the potential to make a significant impact in conservation biology research.

[1] Caltech Camera Traps (CCT) https://beerys.github.io/CaltechCameraTraps/