

Report on Animal Detection Model for Carnivorous and Herbivorous Animals

Introduction

The Animal Detection Model categorizes animals as carnivores or herbivores using computer vision techniques. This project integrates machine learning with a user-friendly GUI to detect animals from both image and video inputs.

Background

This project leverages the YOLOv11 object detection algorithm, trained on a dataset from Roboflow containing labeled images of carnivorous and herbivorous animals. The application incorporates a graphical user interface (GUI) built with Tkinter to simplify interaction and input processing.

Learning Objectives

- Understand and implement YOLOv11 for object detection.
- Train a model to classify animals into carnivores and herbivores.
- Develop an intuitive GUI for processing and visualizing detection results.

Activities and Tasks

1. Dataset Preparation

- Downloaded and preprocessed the Roboflow dataset.
- Split the dataset into training and validation sets.

2. Model Training

- Configured YOLOv11 for the dataset.

3. GUI Development

- Designed and implemented a Tkinter-based interface.
- Integrated image and video input functionalities.

4. Testing and Validation

- Evaluated the model's performance on unseen data.
- Verified GUI accuracy and responsiveness with multiple inputs.

Skills and Competencies

- Proficiency in YOLO object detection frameworks.
- GUI development using Tkinter.
- Knowledge of dataset preprocessing and augmentation.
- Familiarity with Python libraries such as OpenCV for video processing.

Feedback and Evidence

- **Model Performance:** Achieved an mAP50 of 76% and an mAP50-95 of 58%.
- **User Feedback:** Positive reception for the GUI's simplicity and real-time detection capabilities.
- **Evidence:** Confusion matrices, prediction outputs, and qualitative testing results demonstrate robust model performance.

Challenges and Solutions

1. **Challenge:** Handling real-time video inputs in the GUI.
Solution: Optimized video processing using threading and OpenCV.

Outcomes and Impact

- The model effectively detects and categorizes animals into carnivores and herbivores.
- The application provides a practical solution for wildlife monitoring and educational tools.
- This project showcases the potential of combining deep learning with interactive applications.

Conclusion

The Animal Detection Model successfully integrates YOLOv11 with a Tkinter-based GUI to deliver an effective solution for detecting carnivorous and herbivorous animals. By addressing challenges and improving model accuracy, this project sets a foundation for further advancements in animal detection applications.