Zoo Animal Tracking Web Application Documentation

Introduction

The Zoo Animal Tracking Web Application is a computer vision-based tool that allows users to track various animals in a zoo environment. The web application is built using the Flask framework and incorporates a computer vision model capable of detecting and tracking ten different animal classes, including humans.

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Features

- Detection and tracking of ten different animal classes, including humans.
- A user-friendly web interface with three main pages: Home Page, Video Upload Page, and Live WebCam Page.
- Ability to upload videos for animal tracking or use the webcam for real-time tracking.
- Automatic identification of animal classes in the tracked frames.
- Interactive visualization of the tracking results.

Usage

Home Page

The Home Page is the main entry point of the web application. It displays three links:

- Home Page: This link leads back to the Home Page, serving as a navigation shortcut.
- Video Upload Page: Clicking this link redirects the user to the Video Upload Page, where they can upload a video for animal tracking.
- Live WebCam Page: Clicking this link redirects the user to the Live WebCam Page, where they can enable their webcam for real-time animal tracking.

Video Upload Page

The Video Upload Page allows users to upload a video file containing footage of zoo animals they wish to track. The supported video formats include MP4, AVI, and MKV. Once the video is uploaded, the application's computer vision model will process the frames and identify and track the animals present in the video.

Live WebCam Page

The Live WebCam Page enables users to utilize their device's webcam to perform real-time animal tracking. When accessing this page, the application will start capturing frames from the

webcam and process them in real-time, detecting and tracking the animals within the video stream.

Model Details

The computer vision model used in the Zoo Animal Tracking Web Application is a deep learning-based object detection and tracking model. It has been trained on a labeled dataset that includes ten different animal classes, allowing it to accurately identify and track animals in the zoo environment. The model is capable of real-time processing, making it suitable for both video files and live webcam streams.

Supported Classes

The computer vision model is capable of detecting and tracking the following ten classes, including humans (person):

Bird
Cow
'Deer
Dog
Elephant
Giraffe
Person
Pig
Sheep

Recommendations:

- For the best results, use videos with good lighting and clear visibility of zoo animals.
- Ensure that the camera for the Live Webcam Page is positioned appropriately to capture zoo animals effectively.

Technology Stack

The Zoo Animal Tracking Web Application is built using the following technology stack:

- Python: The primary programming language used for developing the application and the computer vision model.
- Yolov8: **The newest state-of-the-art YOLO model that can be used for object detection**
- Flask: The web framework utilized for building the user interface and handling web requests.
- OpenCV: Used for image and video processing, object detection, and tracking.
- Deep Learning: The computer vision model is implemented using deep learning techniques and frameworks like TensorFlow or PyTorch.
- HTML/CSS: Used for structuring and styling the web application's user interface.

Future Improvements

Here are some potential improvements for the Zoo Animal Tracking Web Application:

1. Enhance Model Performance: Continuously improve the accuracy and efficiency of the computer vision model through additional training and optimizations.

2. Integration with Zoo Surveillance Systems: Integrate the application with existing zoo surveillance systems for seamless animal tracking and management.

3. Mobile Compatibility: Adapt the web application to be mobile-responsive, allowing users to access it on their smartphones and tablets.

4. Customizable Tracking: Allow users to select specific animal classes they wish to track or add support for tracking custom classes.

Conclusion

The Zoo Animal Tracking Web Application provides an intuitive and efficient tool for tracking various animals within a zoo environment. Its user-friendly interface, video upload, and live webcam tracking features make it a valuable asset for zoo management and researchers in studying animal behavior and improving animal welfare. With potential future improvements, the application holds promise for further advancements in the field of computer vision-based animal tracking and monitoring.