C.A.T.S. Camera Assisted Tracking System

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THE PROBLEM

Overview

Due to their elusive nature, feral cat populations are a far more prevalent problem than it appears, with estimates recording **1.3 Million** stray cats in New Jersey alone, and over **70 Million** in the United States. The unmitigated population growth of these strays increase animal control costs and promote euthanasia as local shelters struggle with overcrowding. The larger community faces the intrusion of strays on public and private property, which pose a threat to local wildlife and impact health, safety, and quality of life for residents.

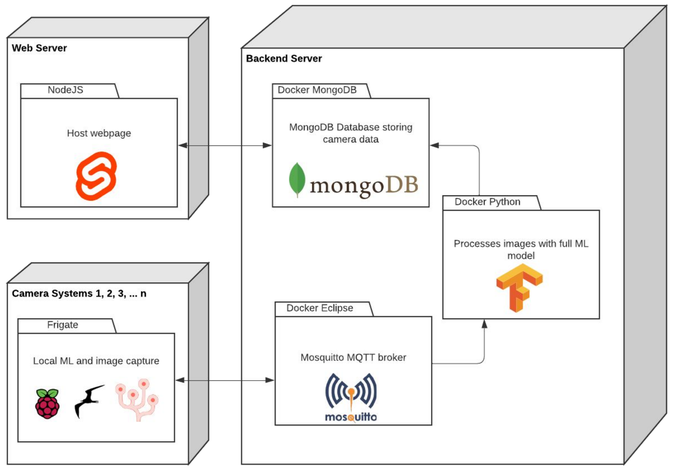
Current Efforts

The most progressive efforts made to control these populations are Trap, Neuter, and Release programs, or TNR for short. This method entails capturing feral cats within a colony and then neutering, vaccinating, and marking them before they are released back to their original territory, where they are then monitored and provided for. These efforts help stabilize and improve the health of stray cats, stopping population growth at the source. However, the efficacy of TNR is drastically hindered by the intensive labor and costs as this is a highly manual process, in which workers and volunteers need to physically locate and trap large populations of cats.

OUR SOLUTION

C.A.T.S. leverages artificial intelligence and machine learning technologies to create an advanced camera system that intelligently identifies stray cats in a given community and provides detailed insights on their numbers and activity. Using a network of smart cameras and advanced machine learning, our system is able to accurately identify cats at a rate of 98% precision and recall. An integrated user interface on the C.A.T.S website provides centralized tracking, data analysis and key metrics that TNR programs can take advantage of to significantly reduce costs and the amount of time spent in the field.

SYSTEM ARCHITECTURE



SYSTEM RESULTS

Camera Hardware

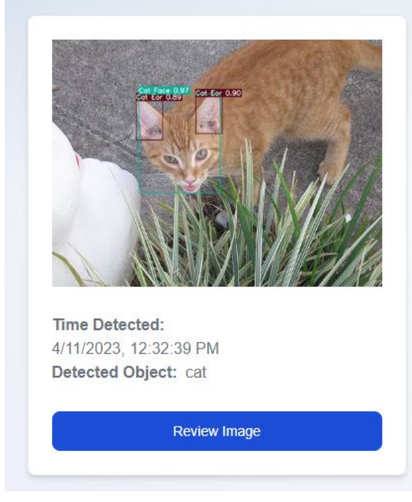
- Pi 4
- NoIR Camera
- PoE or Battery System
- Ethernet, WiFi, and Cellular

Software

- Integrated UI
- Detailed Analytics
- Graphical Insights
- Image Recognition AI
- Authenticated Users
- Dockerized Deployment

Business Considerations

- Crowdsourcing model
- Emphasis on improving communities and serving local interests



MACHINE LEARNING RESULTS

The machine learning on the backend has been a great help at identifying and segmenting the cats by identifying features. We trained two separate models to accomplish this task. The first model seeks to identify cats among animal of similar size and shape, such as dogs, coyotes, foxes, and more, and extract their faces. The second model, using this extracted face, attempts to identify the ears, and whether or not either of them has been clipped. This two stage process helps to remove false positives as early as possible, and make it easier for feeders to identify and label their cats.

FUTURE PLANS

Future development of this project could involve deployment to more cities, better user resources such as guides and detailed blog posts, improved machine learning models, and enhanced UI/UX of the app.

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