MA 797 Project

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1 Introduction

Candid Critters,[1] is a camera trap survey of wildlife in North Carolina. Citizen scientists operate 3780 wildlife cameras, spread out over all 100 counties in the state. In addition to engaging North Carolina citizens in science, their objective is to collect wildlife data that will be useful for management and conservation questions. Current classification techniques require volunteers to manually label thousands of images, resulting in several weeks of data collection downtime, while the current set of data is processes, labeled, and analyzed. To this end, we plan on using machine learning to classify species of animal captured on these cameras.

2 Data Set

Dr. Roland Kays, Research Associate Professor at NCSU and Director of Biodiversity & Earth Observation Lab at the Nature Research Center, NC Museum of Natural Sciences is a leader of the eMammal project, which includes North Carolina Candid Critters. We are in the process of obtaining an annotated dataset from him, presumably consisting of thousands of labeled images we could run machine learning on in order to identify the critters in each image. These images are separated by daytime full-colour images, and nighttime infrared images.

3 Machine Learning Techniques

Existing computer vision techniques resulted in an accuracy of around 82% [2] using a variety of techniques, including a few that we discussed in class, such as max-pooling and linear support vector machines.

3.1 Preprocessing

We plan on segregating the images into two classes: night IR black and white images, and day full colour images. Since the cameras are stationary, we are also considering using background deletion to isolate the subject to potentially make the feature exrtraction easier.

3.2 Transfer Learning

For the main part of the project, we plan on using transfer learning to apply a pretrained model (e.g. Oxford VGG, Google Inception, or Microsoft ResNet) to the dataset in order to classify the images. We plan to fine-tune the model for new task, as these trained models aren't specifically made to classify animals.

In addition to the typical 70%/30% training/testing split, we also plan on testing the accuracy using similar cameras not not originally included in the dataset to see how well the model generalizes.

References

[1] Candid Critters (2019), *North Carolina Candid Critters* https://www.nccandidcritters.org

[2] Yu, Xiaoyuan and Jiangping, Wang and Kays, Roland and Jansen, Patrick and Wang, Tianjiang and Huang, Thomas (2013), *Automated identification of animal species in camera trap images*, EURASIP Journal on Image and Video Processing, Vol. 1, 10.1186/1687-5281-2013-52