Bird Species Detector
COMP4107
Jerry Deng 101181884

Introduction

In Ontario, there are over 500 species of birds and for nature lovers, it is almost impossible to correctly identify the species of every bird seen. Neural networks can help people identify the types of birds in camera pictures and videos.

Proposed Neural Network Methods

Since this will be a supervised classification task, a convolutional neural network will be used. They are very effective in image recognition since the convolution kernel is much smaller than the original image, it allows dimensionality reduction to reduce computational costs relative to feedforward neural networks.

The base scope of this project is to perform bird species classification on images.
This can be extended, depending on progress, to include:

- Video bird tracking (opencv has some tools for it)
    - May require some video to img conversion
    - Might have to experiment with image distortions (rotation, lighting)
    - Labeled bird species tracking
- Extend to include classification on other species:
    - https://www.kaggle.com/datasets/iamsouravbanerjee/animal-image-dataset-90-different-animals
    - With this approach we can train two different neural networks on each dataset and apply both models to the same image, this will detect potential bird species as well as other animals

Dataset

https://www.kaggle.com/datasets/gpiosenka/100-bird-species

The dataset that will be used in this project contains 500 bird species, 80085 training images, 2500 test images (5 per species) and 2500 validation images (5 per species).
Each image size is 224*224*3.

Proposed validation/analysis strategy

Since the dataset already includes a validation set and test set, the validation set can be used to train the model and the accuracy can be measured on the built in test set. As an alternate approach, I could also split the main dataset (80085 of training images) into a train test split.

Further extensive testing can be to just download known images from google and test if the CNN recognizes bird species in different environments (partially obstructed, standing, flying, in rain/snow).

Analysis can include changing the various parameters of a neural network (for CNN, # layers, # neurons, # epochs, pooling size, downsampling rate) and graph results relative to performance.

For video detection, it will just be manual confirmation that appropriate birds are identified correctly.

Weekly Schedule/Timeline
Feb 27-Mar 5: Understand dataset, finish data preprocessing
Mar 6 - Mar 12: Build CNN model
Mar 13 - Mar 19: Train and experiment CNN model on dataset, as well as other images
Mar 20 - Mar 26: Add video tracking
Mar 27 - Apr 2: Test and perform analysis on video tracking
Apr 3 - Apr 9: Final touches

Availability for project demonstration
Online preferred:
Tuesday, April 11: 2-3pm
Tuesday, April 11: 3-4pm
Thursday, April 13: 2-3pm
Thursday, April 13: 3-4pm
Tuesday, April 11: 10-11am
Monday, April 10: 12-1pm
Monday, April 10: 11am-12pm

Requires access to GPU resources
No access through scs needed