Project Proposal
Maisey Toczek

Problem

You look out your kitchen window to see a small bird with a rosy head and streaky brown feathers. What kind of bird could it be? With over 500 species inhabiting Colorado alone, becoming skilled at identifying birds can be very time-consuming. To make identification even more complicated, many species will appear entirely different depending on whether they are male or female, juvenile or adult. While there is a lot of joy in being able to quickly name the birds you see, sometimes you need a little help with figuring it out, and bird guidebooks can often be incomplete or difficult to travel with. What if there was a tool to help you with this? Snap a picture of the bird, upload it to the application, and get identification quickly. This makes getting into birding accessible and hassle-free.

Solution

Machine learning can be used to identify the birds through classification. To do this, I will be using this dataset from Caltech and UCSD which contains approximately 12,000 images that are associated with 200 species of birds. Each image has 15 part locations, 312 binary attributes, and 1 bounding box to achieve data normalization. I am choosing convolutional neural networks (CNNs) as my deep learning architecture for this problem as they have historically been very successful at achieving high levels of accuracy in image-related projects. I will be working to create a bird classification models using two popular CNNs (ResNet and SqueezeNet) and comparing them to see which achieves better results.

Measure of Success

Identifying bird species, especially female birds within bird families, can be tricky. Considering that my data set only has approximately 60 images per species, I worry that the accuracy of certain species could be very low. A bird such as a Canada Goose or Barn Owl may have very distinct features, but others such as the Black-capped Chickadee and Mountain Chickadee will have a lot of similarities in shape and color. All things considered, I will consider this a success if the model can achieve 70% classification accuracy with the validation set. If I run into issues with accuracy problems or overfitting, I will start applying techniques such as adding/subtracting convolution layers, data augmentation, batch normalization, and learning rate scheduling. My overarching goal is to learn what changes lead to better results, even if I am not able to get to the desired accuracy with the current dataset.

https://www.kaggle.com/datasets/veeralakrishna/200-bird-species-with-11788-images