

Capstone 3 Project : BirdBrain

Problem Statement:

How can we identify the images of birds and the bird species with increasing photograph sets produced by the current bird camera and the 5 to be added to the network?

Context:

About two years ago a graphic designer friend that works for a local bird food company took a joke made by my girlfriend and got her company to buy us a bird photobooth 2.0 for our backyard. We in exchange give them all commercial rights to the photos on and copies of the images on usb drives we trade back and forth on our monthly settlers of catan gaming nights at that friends home. The one camera produces up to 9500 photos in a single month, a good portion of those are nearly identical or out of focus. To simplify the use of these photos as a de-stressing activity for my girlfriend or marketing materials for that company, filtering through the images for quality and a bird being present is needed. Filtering them further into species (and eventually food mixture they are eating) will provide the most entertainment and value for all consuming the images. Due to the bird photobooth 2.0, in anticipation of the merlin photo feeder that is due to arrive in March, and a series of raspberrypi motion detection cameras with solar powered batteries I have been building, manually filtering the images will no longer be viable.

Criteria for success:

A system for automating the object detection and species identification of any birds in the photos needs to be created. It must handle a minimum of the object detection in 10,000 images a month, ideally 60,000 images a month.

Scope of the solution space:

The creation of a microservice using Uvicorn as the webserver and FastAPI as the api framework.

Creation of an image upload endpoint that returns a json object array that contains object labels with bounding box corners (X axis: [left, right] Y axis: [top, bottom]) for each object identified in the image.

Creation of a local script to watch for and process files after they are written to the NAS, then moved to sorted directories structures based upon the results.

Constraints within the solution space:

The local hardware on my network may not be able to handle the images in that volume. The microservice may need to scale horizontally to handle the load, an application gateway api may need to be created to handle parallelizing the processing across multiple containers. Possible need to move to cloud computing resources (Azure or hadoop for my current skill set).

Stakeholders:

Me - Chief Data Scientist and Machine Learning Engineer in the house

Candie - Quality Control / Consumer of Stress Reducing animal pictures

Brittany - Quality Control / Graphic Designer consumer of marketing materials and stress reducing animal pictures

Key Data Sources:

ImageNet for transfer learning

<https://www.kaggle.com/c/imagenet-object-localization-challenge/overview/description>

Kaggle Dataset: <https://www.kaggle.com/gpiosenka/100-bird-species>