Conservationists are often tasked with measuring the approximate populations of birds in an area, which can be very difficult when the area and number of species in said area are both quite large. One way to mitigate this is to use a neural network for image classification, which would largely negate the need for someone to go through potentially hours of footage identifying which birds have been present in a wildlife camera's field of view.

Data Used:

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

Methodology:

Since the data used for this experiment was already in a very easy to use format, no real cleaning was needed. Once the images were read into numerical data, they were passed to Keras, which handles the model architecture and training through tensorflow. Since resources for training were limited, several potential models were selected and trained minimally. The models selected were various architectures accessible through Keras that were meant for image processing. This revealed EfficientNet and EfficientNetV2 to have the most accuracy and lowest loss by far with the least training, so those models were selected for further optimization. With greater resources, the other models may in fact outperform the final model presented here.

Results:

The model in question was able to achieve an accuracy of .932 on validation data, producing classifications for 400 different species.

The model utilizes the EfficientNetV2 architecture to vastly cut down on resources needed for training. If more resources are available, even greater accuracy may be achievable by training more layers and/or larger versions of this network.

Training was done using cropped pictures of birds, so it may be necessary to implement another layer to do the identification and cropping, likely using motion detection. Additionally, more species could be added or possibly removed based on geographic location if more training is done.