# Problem Statement

The primary objective of our project is to train a CNN model that can accurately classify bird species based on the visual features present in the images. The model will need to successfully differentiate between 20 species of birds.

# Problem Set Up

The 20 bird species used for this project are a random selection of the 525 species in this [Kaggle dataset](https://www.kaggle.com/datasets/gpiosenka/100-bird-species), but include a variety of birds. They include larger birds such as herons and eagles as well as smaller birds such as barbets and quails.

The training data includes 100 images per species. The data author also provided a validation and a test with 5 images of each species in both. The images are all size 224x224 and contain only a single bird that comprises at least 50% of the pixels in the image.

The training dataset contains more male birds than female birds, giving it a bias towards the males, which tend to be more colorful and decorative.

ADD SOME BIRD PICS

# Model Implementation

## Baseline Pretrained Model

As a benchmark for the problem, an EfficeintNetB0 pretrained model was used to set a baseline. Using ImageNet weights, the model achieved an accuracy of 100% on the validation data after only 4 epochs. This indicated that this problem was sell suited to a neural network architecture.

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## Initial Model

To evaluate a starting point for the model, and assess the classes that were performing well, an initial model was trained with 1 CNN layer, a pooling layer, and a softmax prediction layer.

Using early stopping, the model achieved a validation accuracy of 81% within 21 epochs.

# Model Refinement

## Increased Complexity

## Grayscale Image Evaluation

## Progressive Resizing

## Additional Images

# Test Results

# Next Steps